

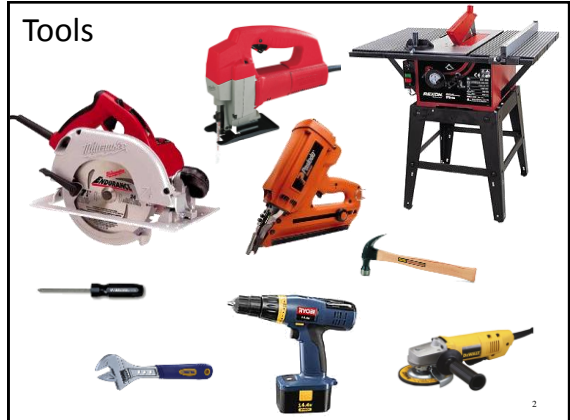


Department of Mechanical Engineering
GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY

Workshop Technology

WORKSHOP TOOLS

Tools



Hand Tools



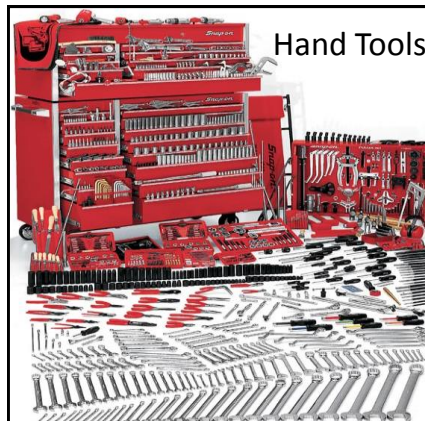
Selection of tools

1. Select the right tool for the job.
2. Consider the tools shape and size – the tool should be comfortable to hold.
3. Do not select undersized tools for the job.
4. Consider the quality of the tool including its sharpness for cutting.
5. Select power tools designed to have minimal vibration.
6. Select power tools that provide guarding and other safety features such as an automatic shutoff, safety trigger, shield or guard.

Selection of Tools

7. Select electric power tools that are double-insulated.
8. Select power tools that have the Underwriters .
9. Select spark-resistant tools when working around flammables or explosive material.
10. Select battery powered tools for wet locations.

Hand Tools

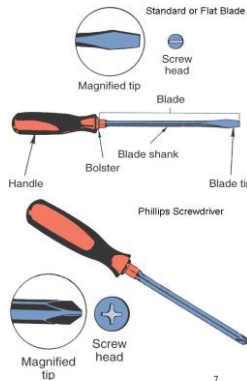


A Typical Set of Hand Tools

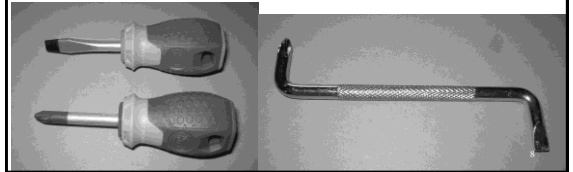
Hand Tools

• Screwdrivers

- A variety of tips and sizes are available to fit the various types of screws used.
- Standard (flat blade) and the Phillips screwdrivers are commonly used in the automotive industry.



- Stubby screwdrivers - Both straight blade and Phillips screwdrivers are available with a short blade and handle for access to fasteners with limited room.
- Offset Screwdrivers - An offset screwdriver is bent at the ends and is used similar to a wrench.



Hand Tools

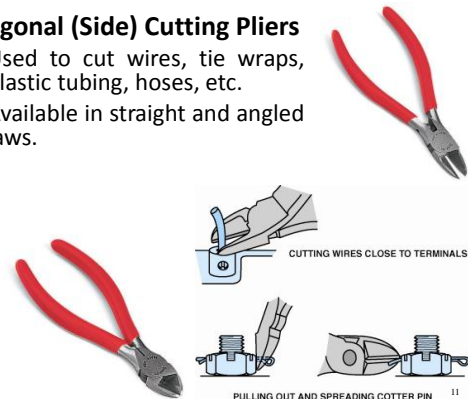
• Pliers

- Different sizes and jaw shapes are available for various tasks.
- Also available with standard, locking and slip joint handles.



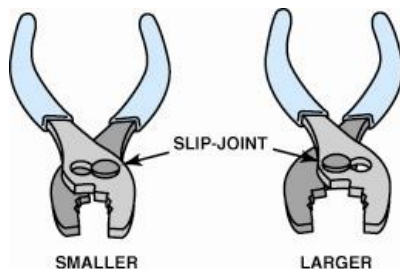
• Diagonal (Side) Cutting Pliers

- Used to cut wires, tie wraps, plastic tubing, hoses, etc.
- Available in straight and angled jaws.



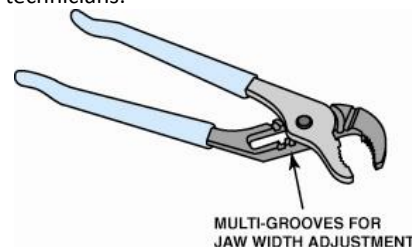
• Slip-Joint and Groove-Joint Pliers

- Used for clamping; they're marked by an adjustable jaw.

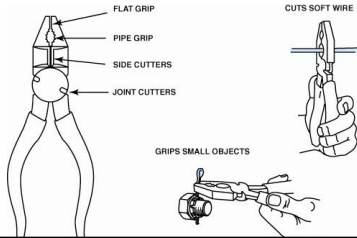


• Multigroove Adjustable Pliers

- For gripping larger objects, a set of **multigroove adjustable plier** is a commonly used tool of choice by many service technicians.



- **Combination pliers (Linesman's Pliers)**
 - Combination plier is a multi purpose plier
 - It may be used by electricians and other tradesmen primarily for gripping, twisting, bending and cutting wire and small cable.



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- **Needle-Nose Pliers (long-nose pliers)**

- **Needle-nose pliers** are designed to grip small objects or objects in tight locations.
- Needle-nose pliers have long, pointed jaws, which allow the tips to reach into narrow openings or groups of small objects.



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- **Locking pliers**

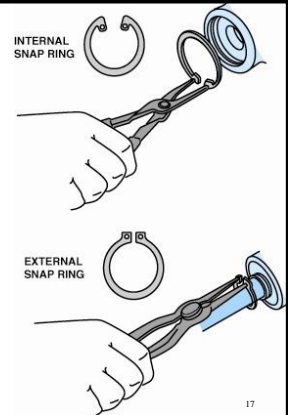
- **Locking pliers** are adjustable pliers that can be locked to hold objects from moving.



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- **Snap-ring pliers**

- **Snap-ring pliers** are used to remove and install snap rings.



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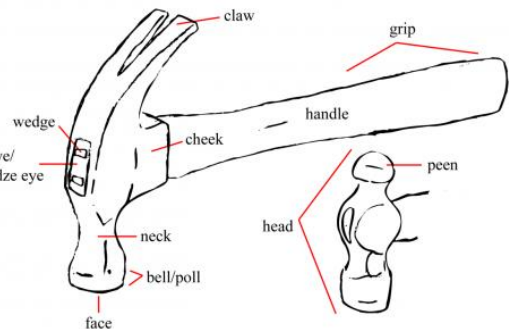
Hand Tools

- **Hammers and mallets**

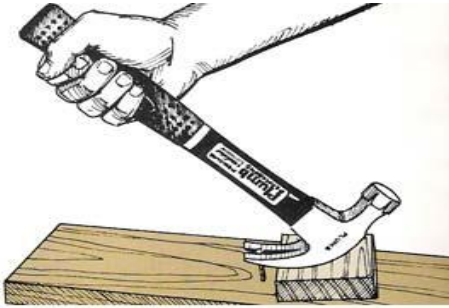
- Used for striking various components.
- Soft-faced and dead-blow hammers are used for striking soft or easily damaged surfaces.



Parts of a Hammer



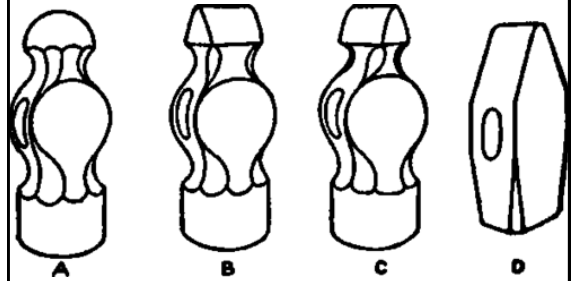
- Claw Hammer



Use a block of wood to avoid marring wood while pulling nails.

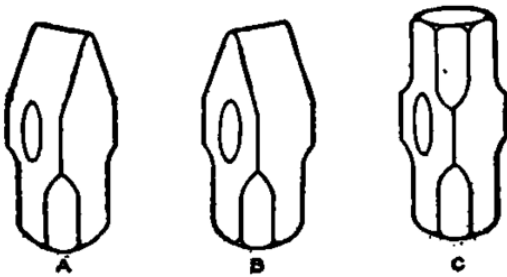
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Common Types of Hammers



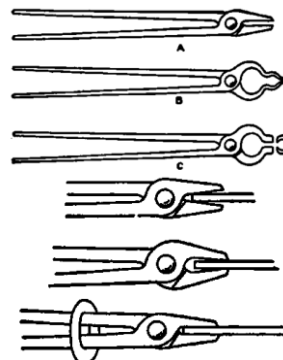
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Common Types of Sledges



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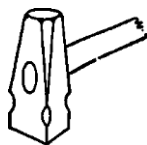
Tongs



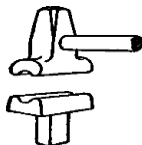
- Fitting Tongs for work

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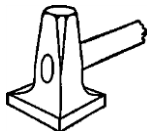
Set Hammers and Flatteners



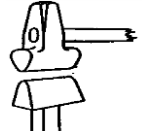
- Set Hammer



- Swages



- Flatter



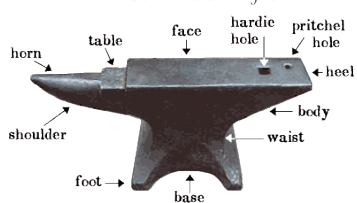
- Fullers

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Anvil & Swage Blocks

- The ordinary anvil

The London Anvil (Peter Wright, 100 lbs.)

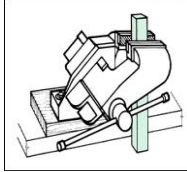


Information Source: Alex W. Bealer, *The Art of Blacksmithing*



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Bench vice



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Hand Tools

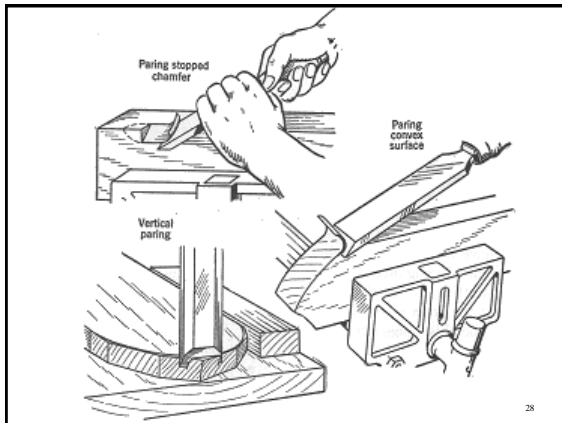
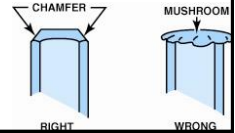
• Punches

- Used for driving out pins, rivets, or shafts; aligning holes in components; and marking the starting point for drilling a hole.

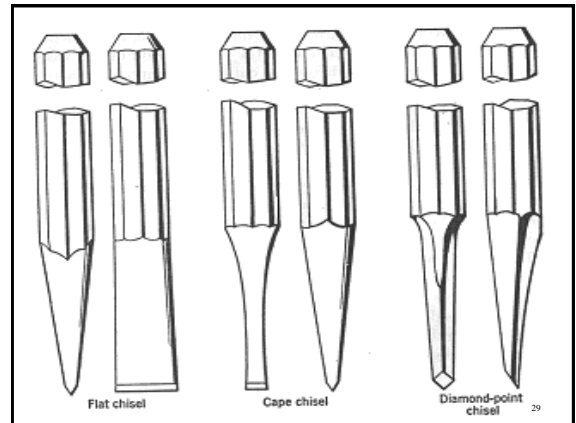
• Chisels

- Used for cutting metal when driven by a hammer. Can be used to shear off bolt and rivet heads.

CAUTION – Always keep the striking end free from burrs and mushrooming.



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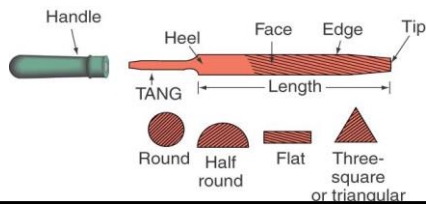


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Hand Tools

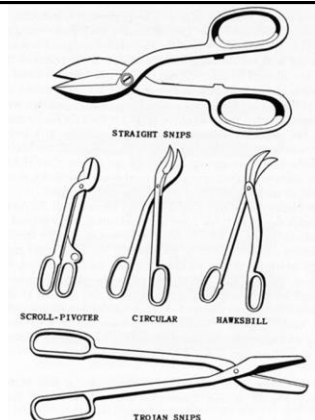
• Files

- Commonly used to shape or smooth metal edges and surfaces.
- They vary in size and coarseness depending on the shape and material being filed.

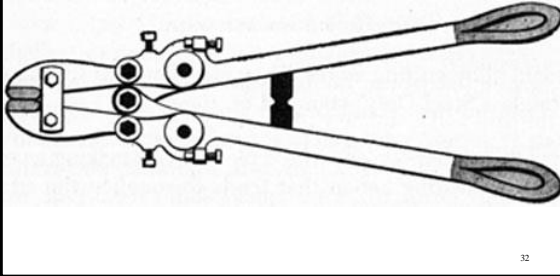


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Snips



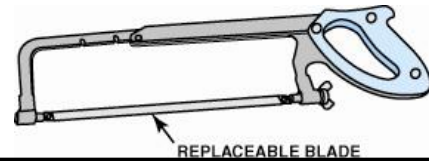
Bolt Cutter



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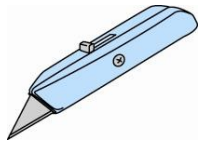
Hacksaws

- A **hacksaw** is used to cut metals, such as steel, aluminum, brass, or copper.
- The cutting blade of a hacksaw is replaceable and the sharpness and number of teeth can be varied to meet the needs of the job.



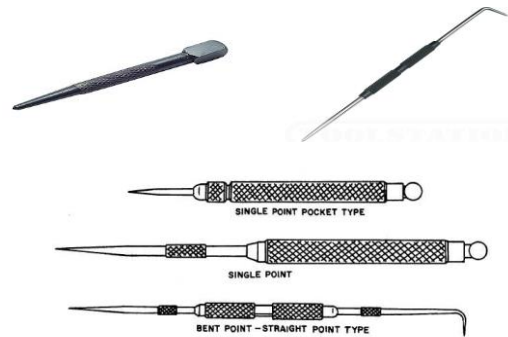
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- A **utility knife** uses a replaceable blade and is used to cut a variety of materials such as carpet, plastic, wood, and paper products, such as cardboard.



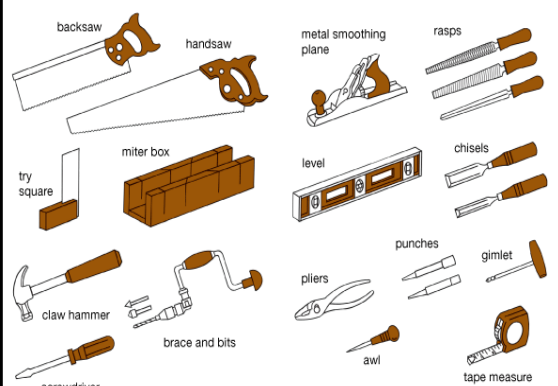
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Scriber, Center punch



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Some other Hand Tools



Hand Tools

- Taps and dies



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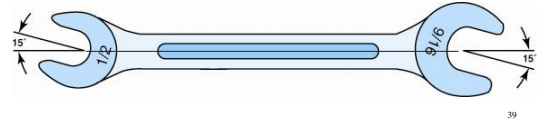
Hand Tools

- Wrenches
 - Double Open-end
 - Double Box-end
 - Combination
 - Allen and Bristol
 - Adjustable
 - Pipe
 - Socket



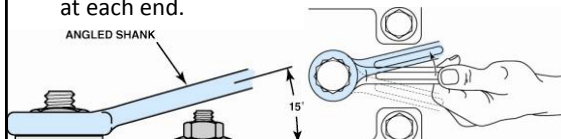
Open-End Wrench

- An **open-end wrench** is usually used to loosen or tighten bolts or nuts that do not require a lot of torque.
- An open-end wrench has two different sizes; one at each end.



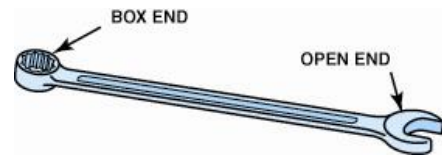
Box-End Wrench

- A **box-end wrench** is placed over the top of the fastener and grips the points of the fastener.
- A box-end wrench is angled 15 degrees to allow it to clear nearby objects.
- A box-end wrench has two different sizes; one at each end.



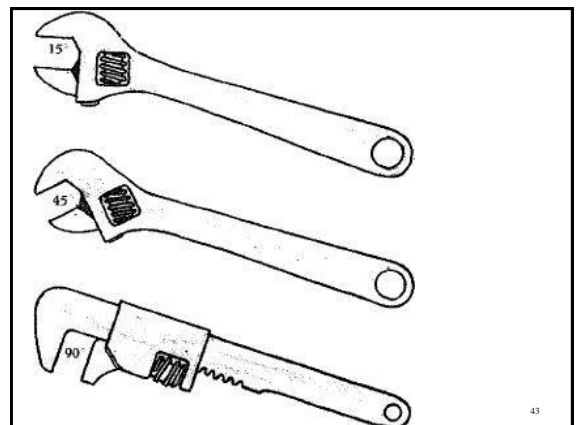
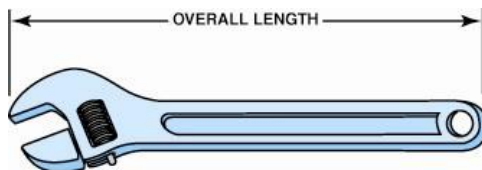
Combination Wrenches

- Most service technicians purchase **combination wrenches**, which have the open end at one end and the same size box end on the other end.



Adjustable Wrench

- An **adjustable wrench** is often used where the exact size wrench is not available or when a large nut, such as a wheel spindle nut, needs to be rotated but not tightened.



Line wrenches

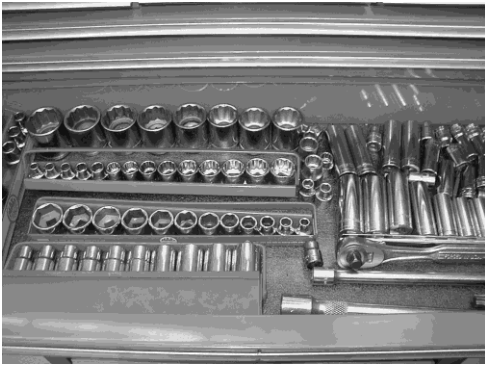
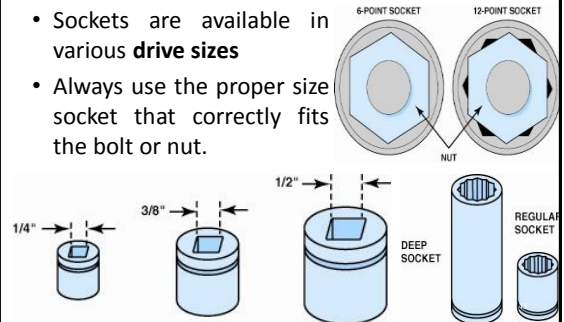
- Line wrenches are also called **flare-nut wrenches**, **fitting wrenches**, or **tube-nut wrenches** and are designed to grip almost all the way around a nut used to retain a fuel or refrigerant line, and yet, be able to be installed over the line.



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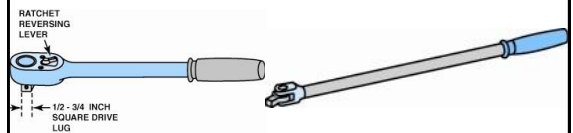
SOCKETS

- Sockets are available in various **drive sizes**
- Always use the proper size socket that correctly fits the bolt or nut.



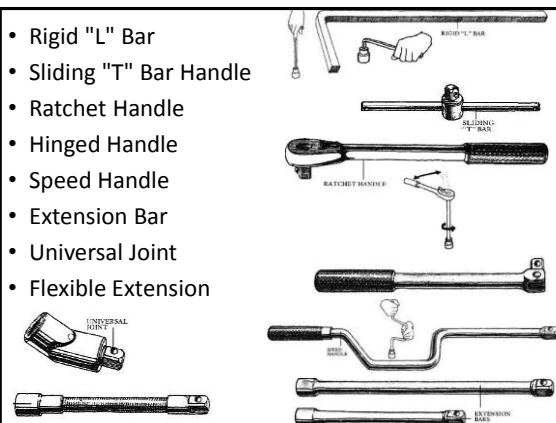
RATCHETS, AND EXTENSIONS

- A **socket** fits over the fastener and grips the points and/or flats of the bolt or nut.
- The socket is rotated (driven) using either a long bar called a **ratchet** or a **breaker bar (flex handle)**.



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- Rigid "L" Bar
- Sliding "T" Bar Handle
- Ratchet Handle
- Hinged Handle
- Speed Handle
- Extension Bar
- Universal Joint
- Flexible Extension



Reversible ratchet handle



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Torque wrenches

- **Torque wrenches** are socket turning handles that are designed to apply a known amount of force to the fastener.

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Types of Torque Wrenches

- Beam
 - Older and not very accurate.
- Dial
 - A dial indicates the amount of torque exerted.
- Digital read out
 - Is usually the most accurate design.
- “Click”
 - When the handle reaches the preset torque, the wrench clicks.



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Power Tools

Tools based on their power source:

1. Electric
2. Pneumatic
3. Gasoline
4. Hydraulic
5. Powder-actuated

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1. Electric Tools

- Soldering irons
- Circular saws
- Drills
- Grinders
- Reciprocating saws
- Routers



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2. Pneumatic impact tools or air-powered

- Grinders
- Nail guns
- Wrenches
- Hammers



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3. Gasoline

- Blowers
- Chain Saws



4. Hydraulic

–Compression Devices

- Embossing
- Punching
- Bending etc..



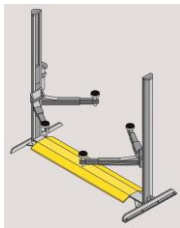
–Lifting devices

- Hydraulic floor jack
 - Is used to raise vehicle off the ground.
 - Is used with safety stands.
 - After lifting Safety stand (Not Hydraulic) Is used to support the vehicle.



–Vehicle Lifts or Hoists

- Can be pneumatic (air pressure) or hydraulic controlled.
- Most modern lifts use electric motor driven cables or screws.



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–Engine hoist

- Is sometimes called a cherry picker.
- Uses hydraulic pressure to lift an engine from a vehicle.



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5. Powder/ Butane

–Nail Guns



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