# Lecture-0 2

# Basic Hand Tools

# Contents (13 Topics)

- Tool rules
- Tool storage
- Wrenches
- Screwdrivers
- Pliers
- Hammers
- Chisels and punches

# Tool Rules

There are several basic tool rules that should be remembered

# Purchase Quality Tools

- With tools, you usually get what you pay for
- Quality tools are lighter, stronger, easier to use, and are usually covered by a warranty

# Keep Tools Organized

- For each tool to be located quickly, the tools should be neatly arranged
- There should be a place for every tool, and every tool should be in its place

# Keep Tools Clean

- Wipe tools clean and dry after each use
- Greasy or oily tools can be dangerous!
  - it is easy to lose your grip on a dirty tool
- Cleaning also prevents corrosion from forming on the tools

# Use the Right Tool for the Job

- Even though several different tools may be used to loosen a bolt, usually one will do a better job
- One tool may be faster, grip the bolt better, be less likely to break, or require less physical effort

# Tool Storage

- Toolbox
  - stores and protects a technician's tools when not in use
- Toolbox Parts
  - lower roll-around cabinet holds bulky, heavy tools
  - upper tool chest holds commonly used tools in easy reach
  - small carrying tray is placed in the upper tool chest and allows tools to be taken to the vehicle more easily

# Toolbox

Never open more than one drawer at a time

# Toolbox Organization

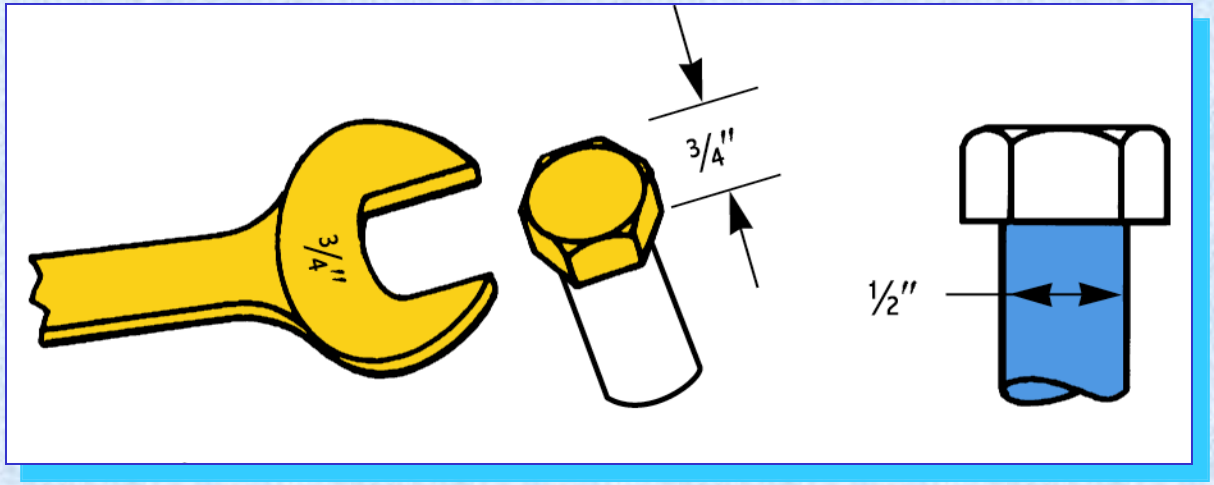
- Related tools are usually kept in the same drawer
  - various types of hammers may be stored in one drawer and all screwdrivers in another
- Small or delicate tools should not be kept with large, heavy tools to prevent damage
- Tool holders help organize small tools

# Wrenches

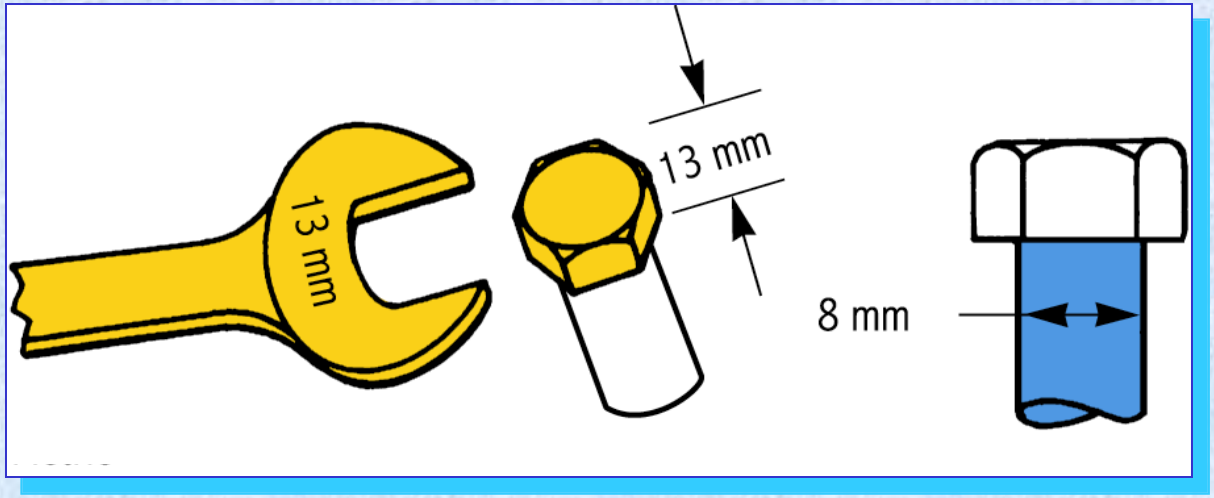
- Used to install and remove nuts and bolts
- Available in both conventional (inch) and metric (millimeter) sizes
  - size is stamped on the side of the wrench
- Wrench size is determined by measuring across the wrench jaws

# Wrench Sizes

## Customary




## Metric



# Rules for Wrench Use

- Always select the right size wrench
  - wrench must fit the bolt head snugly
- Never hammer on a standard wrench
  - use a longer wrench with more leverage or a special slug wrench, which is designed to be used with a hammer

# Rules for Wrench Use

- When possible, pull on the wrench
  - if the wrench slips, you are less likely to hurt your hand
- Never use a steel bar or pipe to increase the length of a wrench
  - excess force can bend or break the wrench

# Open-End Wrench

- Has an open jaw on both ends
- Each end is a different size and set at an angle
- Angle allows the open-end wrench to turn bolts and nuts with little wrench swing space
- Wrench can be turned over between each swing to get a new “bite” on the bolt head

# Box-End Wrench

- Completely closed on both ends
- Will not round off bolt heads as easily as an open-end wrench
- Available with either 6- or 12-point openings

# Combination Wrench

- Has a box-end jaw on one end and an open end on the other
- Both ends are usually the same size
- Provides the advantage of two types of wrenches for the price of one

# Line Wrench

- Also called a tubing wrench or flare nut wrench
- Box-end wrench with a small opening or split in the jaw
- Opening allows the wrench to be slipped over fuel lines, brake lines, or power steering lines
- Prevents damage to soft fittings

# Hand Wrenches


A. Open-end
B. Box-end
C. Combination
D. Tubing or line wrench

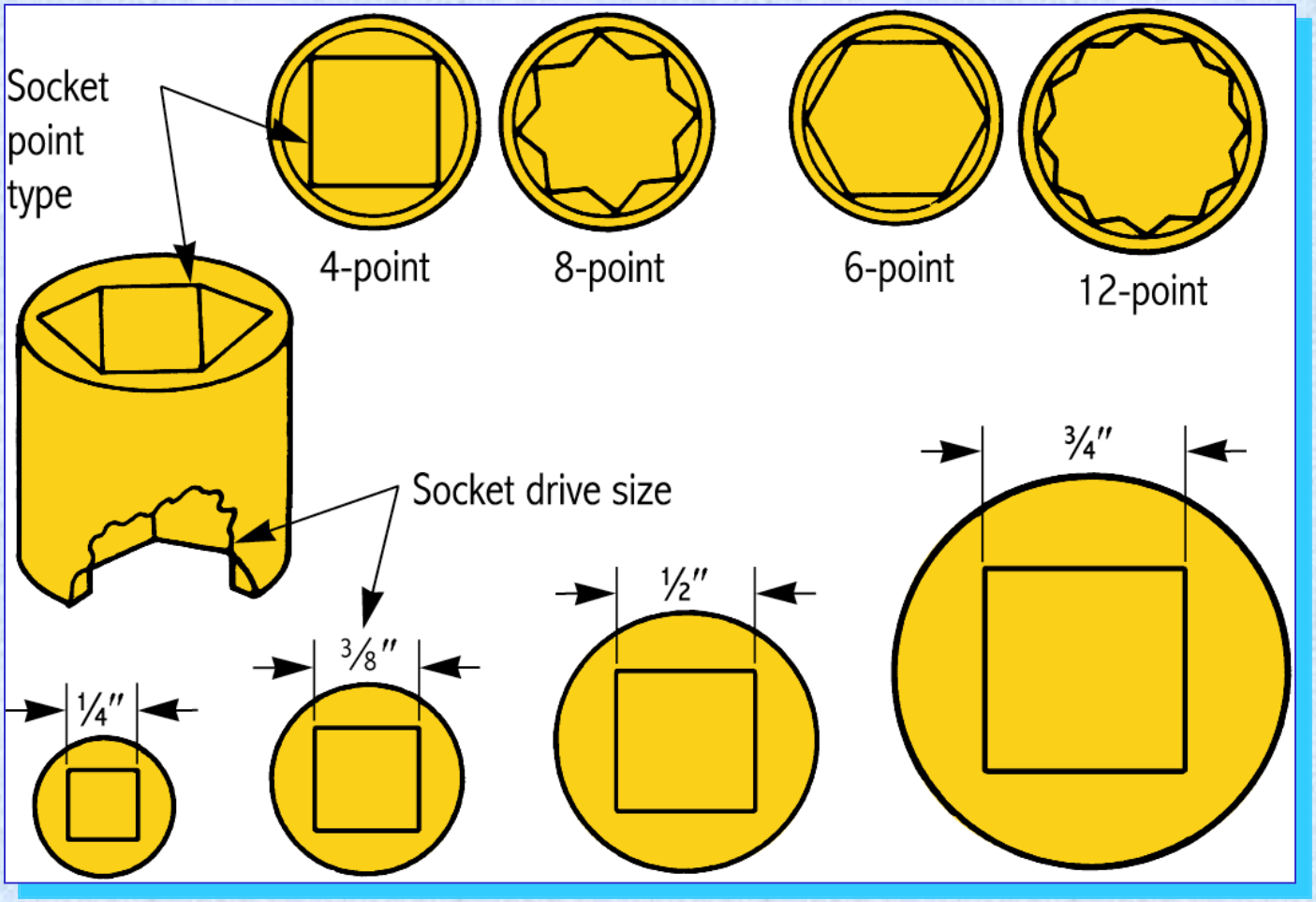
# Socket Wrench (Socket)

- Cylinder-shaped, box-end tool
- One end fits over the fastener, while the other end has a square hole that fits on a handle used for turning

# Socket Terms

- Drive size
  - size of the square opening for the handle
  - common drive sizes are 1/4”, 3/8”, 1/2”, and 3/4”
- Points
  - configuration of the box for the bolt head
  - 4-point, 6-point, 8-point, and 12-point sockets are available

# Socket Terms



# Socket Handles

- Ratchet

- Breaker bar or flex handle

# Socket Handles

- Speed handle

- T-handle

# Socket Handles

- Torque wrench

- Flexible driver

# Extensions

Used between a socket and its handle

# Universal Joint

Swivel that lets the socket wrench reach around obstructions

# Adjustable (Crescent) Wrench

- Has jaws that can be adjusted to fit different size bolt and nut heads
- Used only when other type wrenches will not fit

# Pipe Wrench

- Adjustable wrench used to grasp cylindrical objects
- Toothed jaws actually dig into the object

# Allen Wrench

- Hexagonal shaft-type wrench
- Used to turn set screws on pulleys, gears, and knobs

# Specialty Wrenches

- Ratchet wrench

- Flex-combination

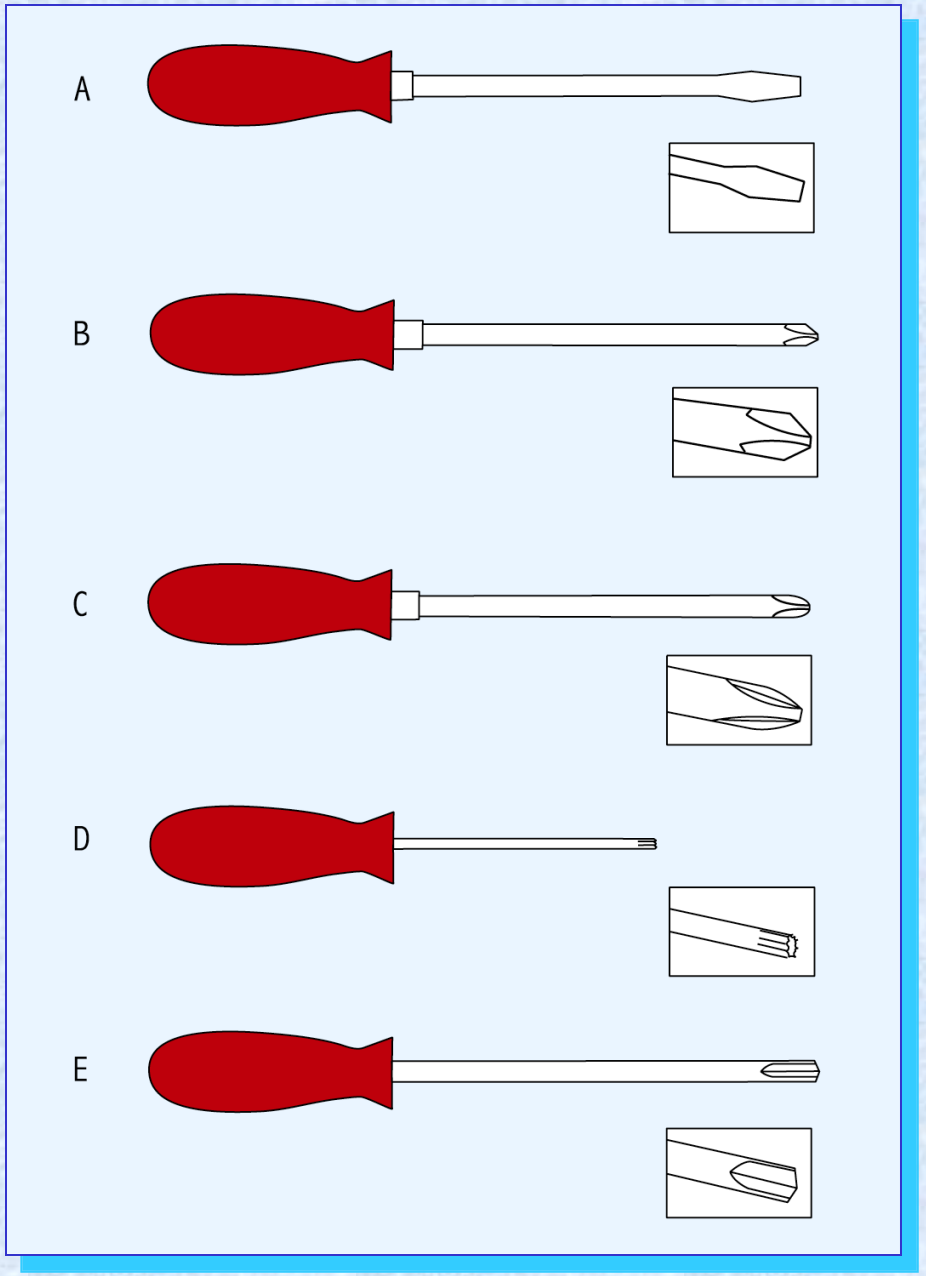
- Half-moon

# Screwdrivers

- Used to remove or install screws
- Available in many shapes and sizes

# Screwdriver Types

A. Standard
B. Phillips
C. Reed and Prince
D. Torx
E. Clutch

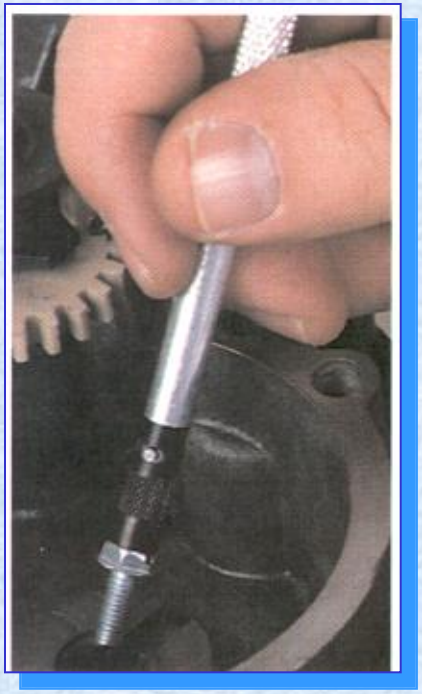


# Screwdriver Types

- Offset

- Stubby

# Screwdriver Types

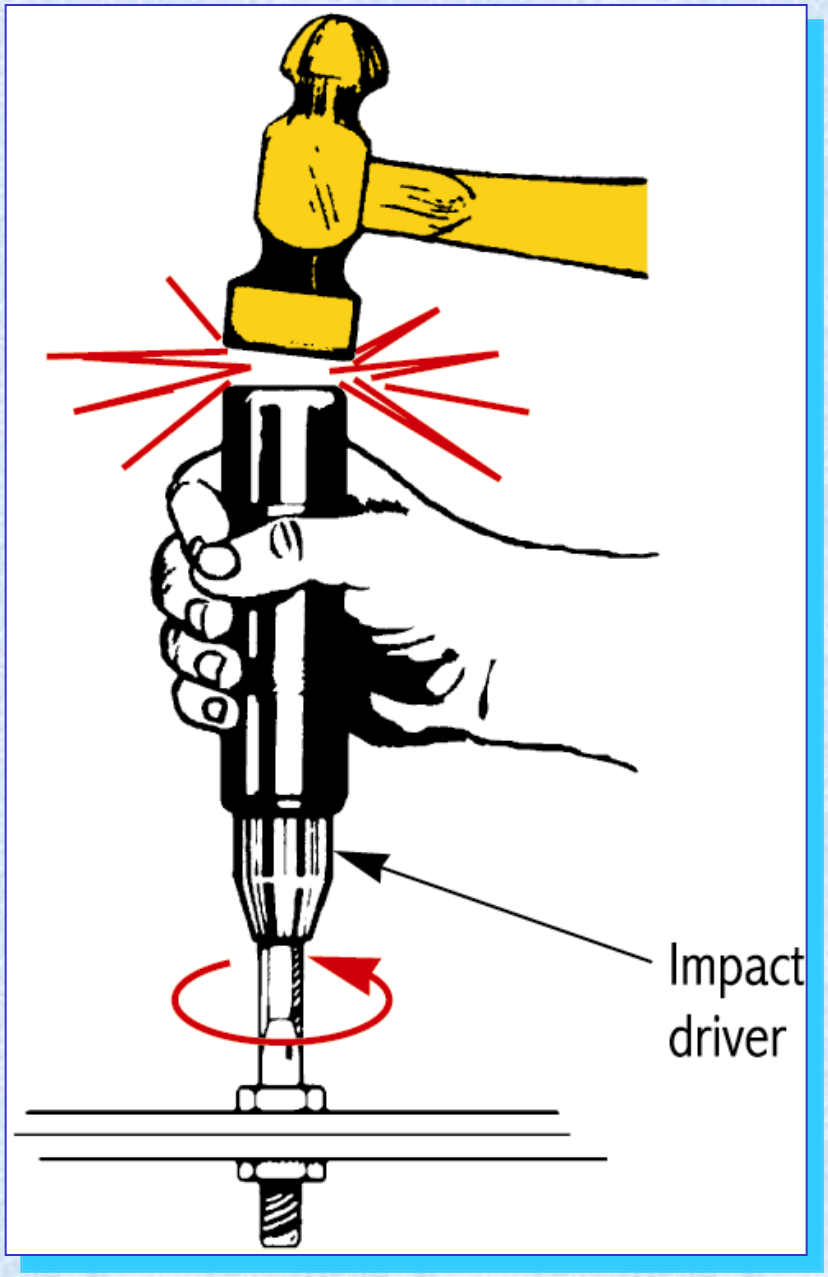


- Awl

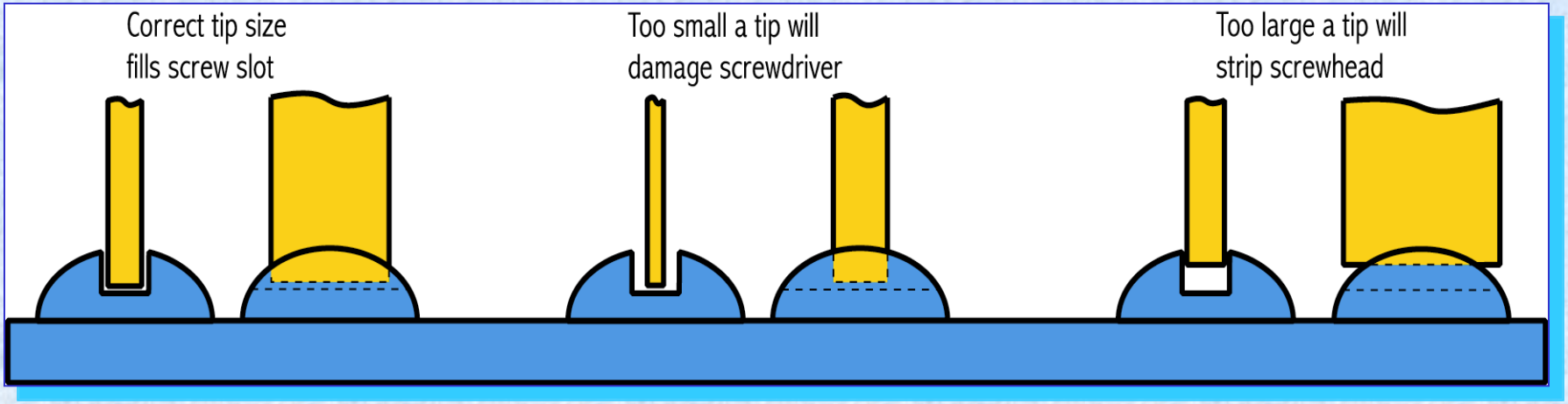
- Starting screwdriver

# Impact Driver

Used to loosen stubborn fasteners. When struck with a hammer, the driver exerts powerful turning and downward forces.



# Selecting a Screwdriver




Screwdriver tip must fit in the slot perfectly

# Pliers

- Used to grip, cut, crimp, hold, and bend various parts
- Never use pliers when another type tool will work
- Pliers can nick and scar a part

# Combination (Slip Joint) Pliers

Slip joint allows the jaws to be adjusted to grasp different size parts

# Rib Joint Pliers

Also called channel lock pliers or water pump pliers. Open extra wide for holding very large objects.

# Needle Nose Pliers

Excellent for handling extremely small parts or reaching into highly restricted areas

# Diagonal Cutting Pliers

Jaw shape allows these pliers to cut items flush with an adjacent surface

# Locking Pliers
## (Vise Grips)

Clamp onto and hold a part. Sometimes used to unscrew fasteners with stripped or rounded heads.

# Snap Ring Pliers

Sharp, pointed tips are useful for installing and removing special clips called snap rings

# Hammers

Various types of hammers are used for operations that involve striking a tool or part

# Rules for Hammer Use

- Select the right size hammer
- Always check that the hammer head is tight on the handle
- Use a brass, plastic, or dead blow hammer on parts and tools that can be damaged by a steel hammer
- Grasp the hammer near the end of the handle and strike the part or tool squarely

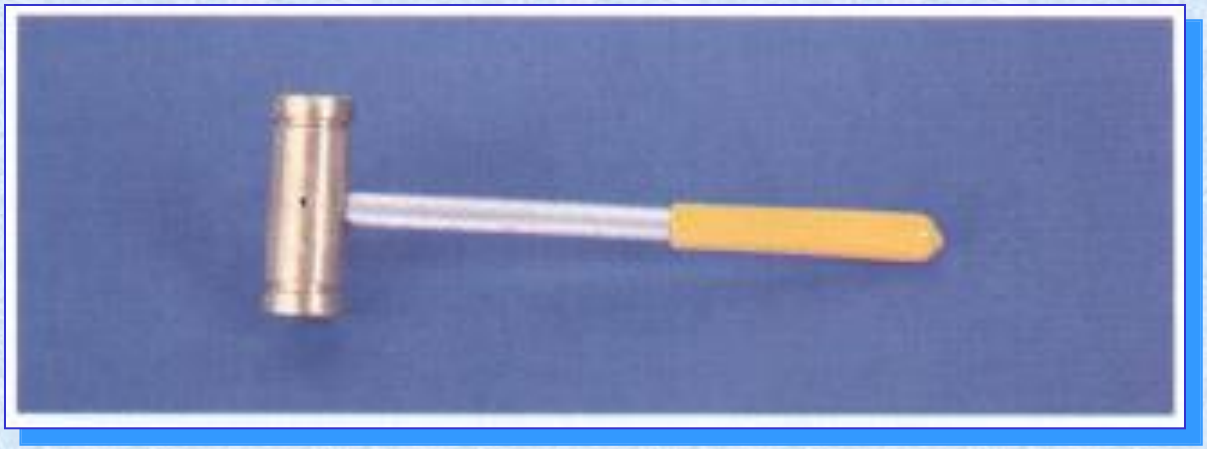
# Ball Peen Hammer

Flat surface is for general striking. Round end is for shaping metal parts, such as sheet metal or rivet heads

# Sledge Hammer

Heavy hammer that produces powerful blows

# Brass Hammer



Provides a soft, heavy head. Head deforms to protect the part surface from damage.

# Plastic (Rawhide) Hammer

Light hammer with a soft head. Used where light blows are needed to prevent part breakage or damage.

# Rubber Mallet

Recommended on many sheet metal or plastic parts, such as moldings and wheel covers

# Dead Blow Hammer

- Features a plastic-coated, metal face
- Filled with small metal balls (lead shot)
- Extra weight prevents a rebound of the hammer when striking
- Plastic coating prevents surface damage