AUTO ENGINE REBUILDING – USE OF HAND TOOLS

USE OF HAND TOOLS

- **Proper use and precision are more important than speed of work while using hand tools. Based on the type of work that needs to be done, He/she must choose the right kind of tools. He/she must be aware of the right tool for the job. Otherwise, the quality and efficiency of work will suffer.**

PLAN AND PREPARE FOR TASKS TO BE UNDERTAKEN

- **Planning is part and parcel of achieving a successful task. Your ability to plan will enable you to attain your purpose. Many successful automotive entrepreneurs have realized their success through proper and careful planning. Likewise, aside from planning, you should also give importance to preparation. Good preparation will boost your confidence because it means that you are ready to do the task because you have sufficient knowledge about it.**

FACTORS TO BE CONSIDERED WHEN YOU PLAN AND PREPARE FOR THE TASKS:

- **PLACE. See to it that the place for doing the task is conducive to work, well ventilated, clean, and has good lighting. A space provided for freedom to move is important. A place chosen will give your idea on what task is to be done**

FACTORS TO BE CONSIDERED WHEN YOU PLAN AND PREPARE FOR THE TASKS:

MATERIALS. Be sure that aside from tools and equipment, necessary materials and fixtures to be used such as bench work and manual of specifications must be available and ready for use.

FACTORS TO BE CONSIDERED WHEN YOU PLAN AND PREPARE FOR THE TASKS:

WASTE DISPOSAL. Used parts or compound substance such as oil, grease and used chemical bottles must be disposed in proper storage bin or container. Non disposal of used chemical substance invites hazard to environment and poses danger to health


WEED
KILLER
ANTIFREEZE
Bathroom
Cleaner
CLEANER
TURPENTINE

FACTORS TO BE CONSIDERED WHEN YOU PLAN AND PREPARE FOR THE TASKS:

TOOLS/EQUIPMENT. Tools and equipment must match with the task to be done. You should be careful enough to choose tools and equipment that are worthy of use. They must be in good condition so that it can be easily utilized without damaging the parts.


POWDER
Fully Automatic
20amp Battery Charger
874157416

FACTORS TO BE CONSIDERED WHEN YOU PLAN AND PREPARE FOR THE TASKS:

- **SAFETY. Always prioritize safety. Remember that accident is not an excusable incident. It can be avoided. Always remember the motto “Safety first”**

Electrical Safety Gloves

Leather Overgloves

SOFAMEL Pneumatic Glove Tester

Kit For Marking Out Restricted Area For Hybrid And EV

Class 1 Arc Flash Helmet

Sofamel BS-45 Rescue Pole 1.75m 45kV

Hybrid And EV Lockout Hasp 38mm Diameter

Electric Shock Rescue Wall Poster

Danger High Voltage Keep Out Sign

Danger High Voltage Sign Small

Danger High Voltage Sign Large

Lockout Tags Pack of 10

FACTORS TO BE CONSIDERED WHEN YOU PLAN AND PREPARE FOR THE TASKS:

- **SERVICE PROCEDURE/TASK. Identify what task to perform before identifying materials and tools to use. The service procedure/task to employ will tell you the corresponding tools and materials needed. Appropriate tools to use with the task will enhance your ability to provide a competitive and efficient service.**

PREPARE AND USE HAND TOOLS

“You’re only as good as the tools you use”

- **This saying has been around for many years and highlights the importance of using the correct tool for the job. Consequently, it means that you are only as good as the tool that you use, too.**

WHAT DO I MEAN BY TOOLS?

- **Devices, equipment, mechanisms, resources, applications — anything that is utilized during the job to assist you in completing your task.**

USE OF HAND TOOLS

When doing any kind of work, tools are needed to have things done. When fixing furniture, repairing home appliances, or doing simple repair, tools help you make work easy, with less effort but with efficient result. Without the needed tools, much time is consumed and more effort is required to accomplish your task. In order for you to accomplish a task efficiently, you must possess basic knowledge on how to identify and select tools that are usable, of good quality and free from faults. The task required calls for the right kind of tools to prepare. Simple jobs usually need simple tools to use. Heavy jobs need the use of heavy tools. Through constant practice, and simple observation, you become skillful in selecting the right tool for the job. In automotive application, it is important that the needed tools are not defective and must be perfect for the job to finish on time. The use of faulty tools might result in injury and damage to you and the parts you are working on. Preparing hand tools to use is easy but requires a lot of practice. Depending on the level of work to be done, whether it is basic level which involves inspection and checking, cleaning and simple fixing of parts; the common level for replacing of basic parts such as air cleaner, fuel filter, hoses; and the core level when performing major tasks such as tune-up, overhauling and under chassis work. The extent of work will give you information to identify and select the size, shape and type of tools needed to accomplish the task.

KIND OF TOOLS

TOOLS FOR A SPECIFIC PROCEDURE/TASK	NAME OF SPECIFIC TOOLS
Cleaning tools	Brushes (fiber and wire), Scraper, Wiping cloth
Cutting Tools	Chisel, File, Hacksaw, Electric drills, Hole saw, Machinist pliers, Side cutting pliers, Tin sni
Driving tools	Hammers - Ball peen, Brass/Plastic, Starting and Drift punch
Bending /Holding/ Twisting/ Crimping Tools/Gadget	Pliers – Combination, Crimping and Splicer, Cutting, Long nose, Vise-grip, Bench vise
Loosening and tightening tools	Wrenches - Allen, Box, Combination, Open, Socket, Spark plug, Torque wrench Screwdrivers – Allen, Flat, Offset, Phillips, Stubby,
Marking tools	Center punch, Scriber
Measuring tools	Caliper, Metal tape measure, Steel rule, Torque wrench

KIND OF TOOLS

- **CLEANING TOOLS**
  - A **variety of accurate and specific tools and products created and designed in various colors, materials, mechanisms, shapes, sizes and styles to clean easily**, effectively and efficiently. Cleaning tools are vital to clean especially when your form of employment involves cleaning.

KIND OF TOOLS

- **CLEANING TOOLS EXAMPLES**
  - **Scraper is a flat thin sheet of metal with wooden or plastic handle. It is used to scrape hard to remove dirt or stubborn grime or plastic sticker.**
  - **Steel/Wire brush are thin strips of metal inserted in a wooden or plastic stock. It is used to remove rust, hard to remove dirt and grime with sweeping action**
  - **Utility rag is a fibrous cloth used in cleaning and wiping dirt and dust.**

KIND OF TOOLS

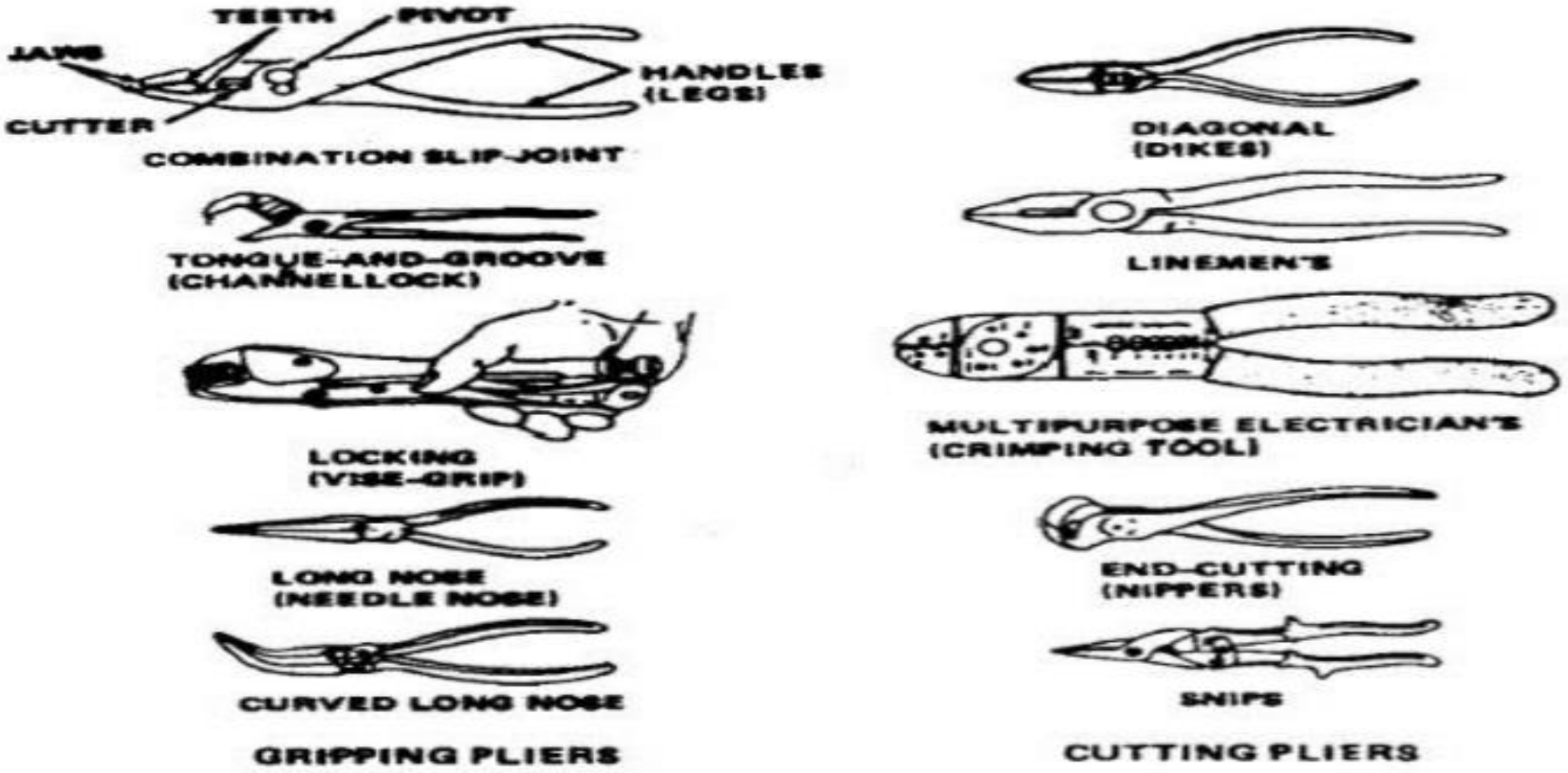
KIND OF TOOLS

- **BENDING/HOLDING/TWISTING/CRIMPING TOOLS**
  - also known as a fixture, is **a support device often used in the manufacturing industry to securely position a tool in a specific spot or orientation**.

KIND OF TOOLS

- **Pliers are generally used as all-around tools. They have the capability for bending, crimping, cutting, holding, stripping and twisting. They are available in various shapes and sizes. Generally, pliers used for electrical job are insulated, whereas those for mechanical work are not insulated but sometimes equipped with rubber for gripping. Pliers are not used as substitute for wrenches.**

a. Pliers – tools with a pair of adjustable pivoted jaws for cutting



Various types of Gripping pliers and cutting pliers

KIND OF TOOLS

- **CUTTING TOOLS**
  - In the context of machining, a cutting tool or cutter is typically a hardened metal tool that is used to cut, shape, and remove material from a workpiece by means of machining tools as well as abrasive tools by way of shear deformation. The majority of these tools are designed exclusively for metals

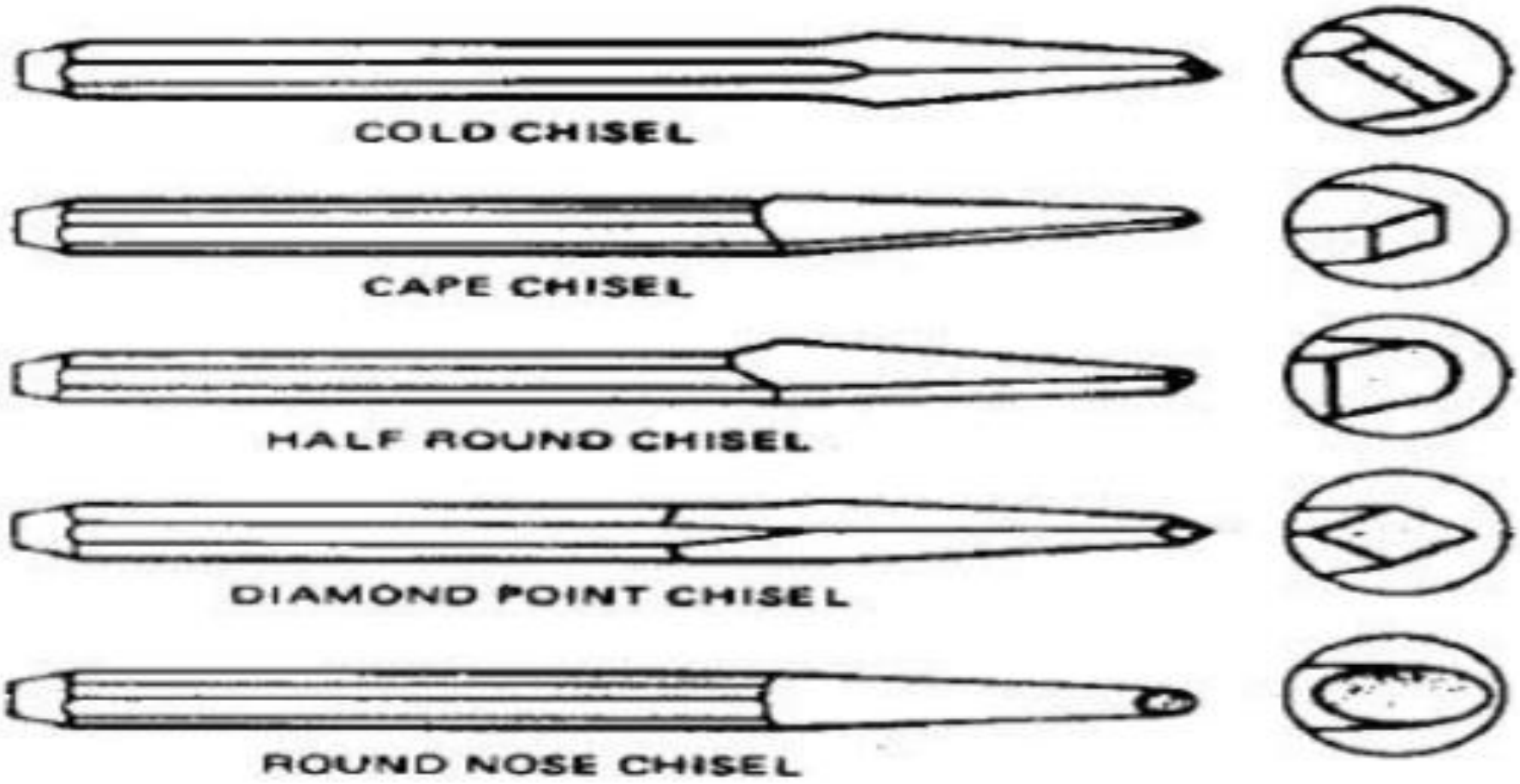
USE OF HAND TOOLS

- **Chisel is a hand tool essentially used for cutting bolts, nuts and rivets. It comes in different types and sizes. A flat cold chisel is used for general cutting. Special chisels like a diamond point are used for cutting sharp-bottomed groove and a round-end chisel for cutting oil grooves.**
- **Hacksaw is an excellent tool for cutting bolts, tubing and light to fairly thick metal. It has a light frame handle with blade connected to both ends of the frame. Depending on the type of work to be cut, a hacksaw blade tooth per inch (TPI) determines the extent of metal to be cut. It comes in 14, 18, 24, 32 teeth per inch. The lower the number, the lesser the number of TPI and the greater its cutting ability. A special hacksaw such as hole saw is used when boring thin and large diameter sheet of metal. It is electrically operated by an electric drill**

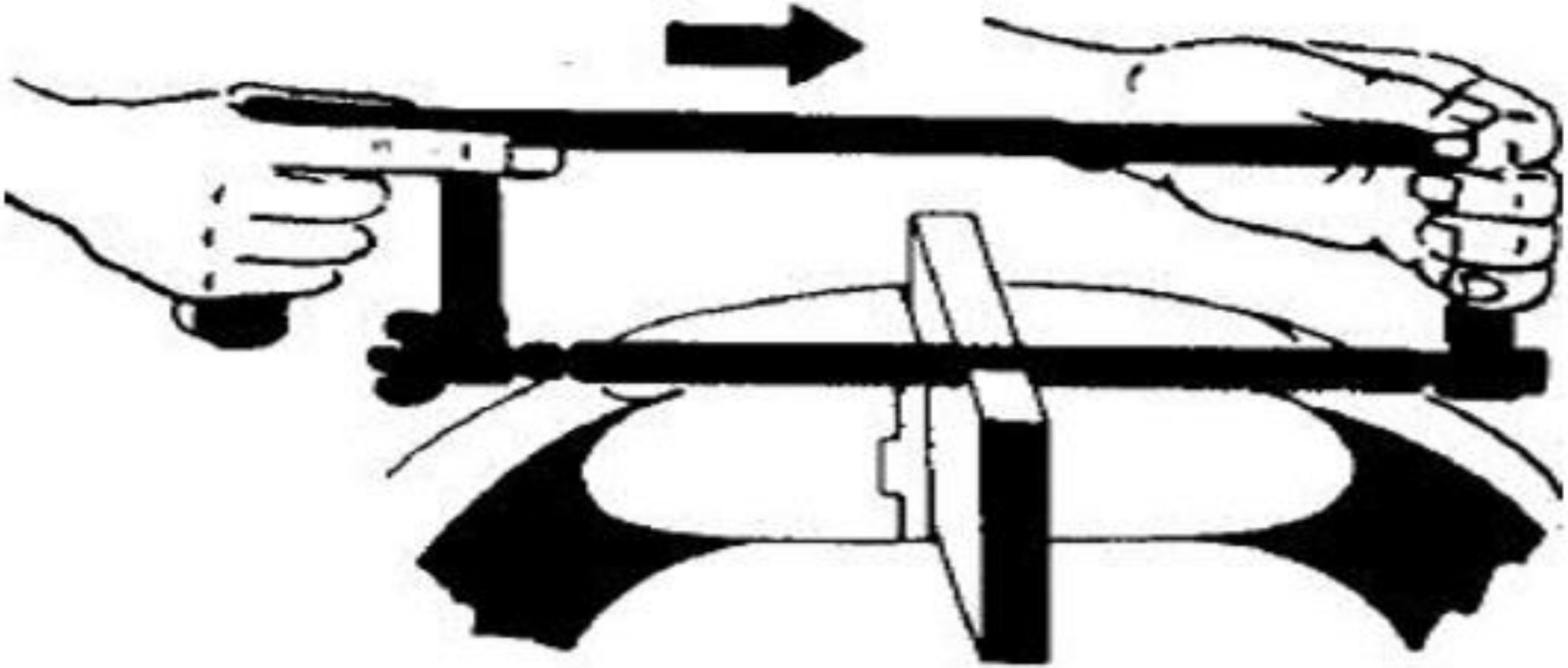
USE OF HAND TOOLS

- **File is a hard steel tool used for smoothening metal. It comes in various shapes such as flat, round, half-round, and triangular. It also comes in different fine-to-coarse cutting edges. A singlecut file has a single series of cutting edges parallel to each other whereas a double-cut file has two sets of cutting edges that cross at an angle.**
- **Tin Snip is a scissor- shaped tool used for cutting thin sheets of metal**

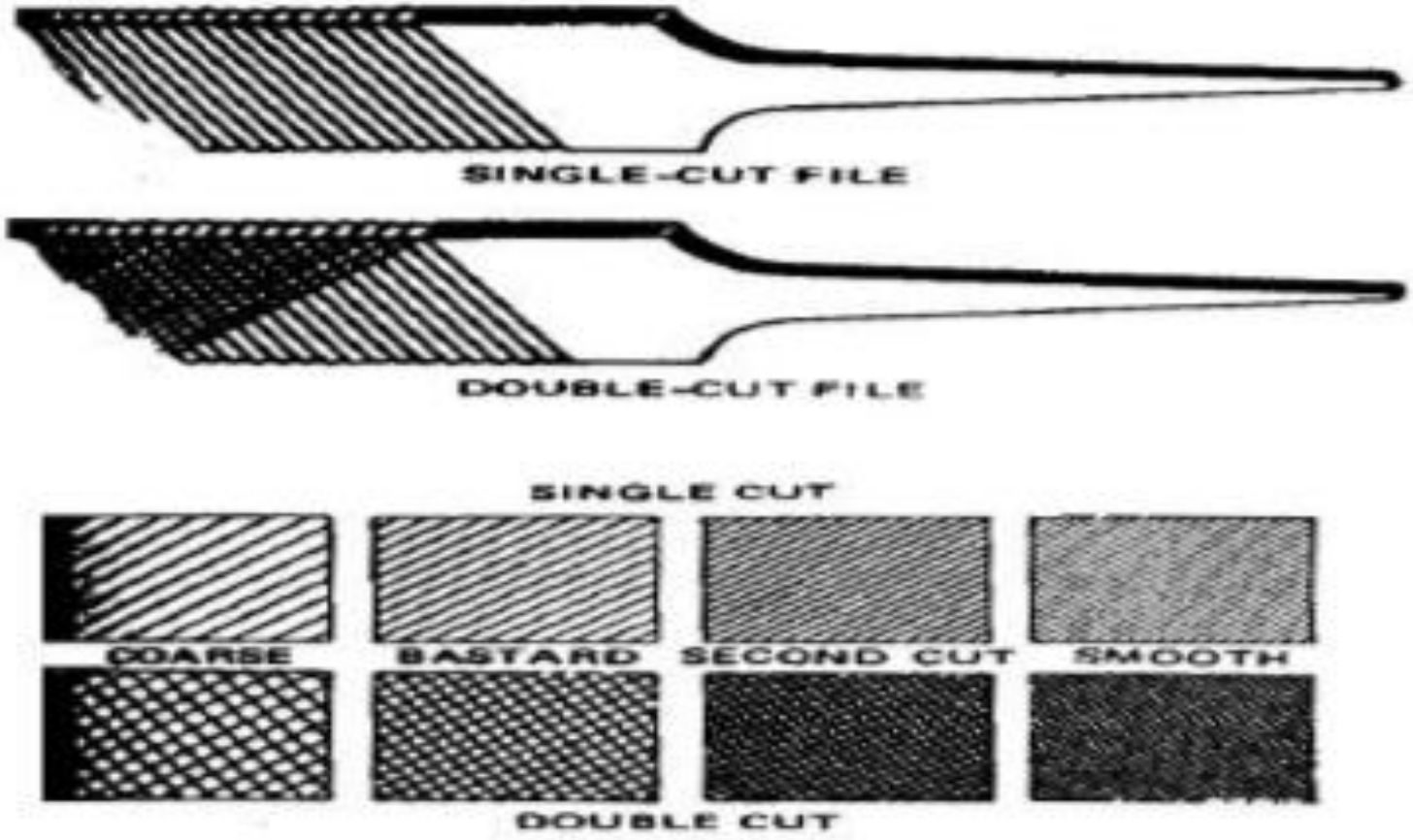
a. Chisel – a cutting tool with a single cutting edge



b. Hacksaw – is basically an adjustable metal frame that holds a steel saw blade.



c. Files – used for cutting and shaping metal



KIND OF TOOLS

- **DRIVING TOOLS**
  - is **any tool used to push (drive) another object into the wood**. Their general purpose is to connect two pieces of wood together, or to connect wood to another material.

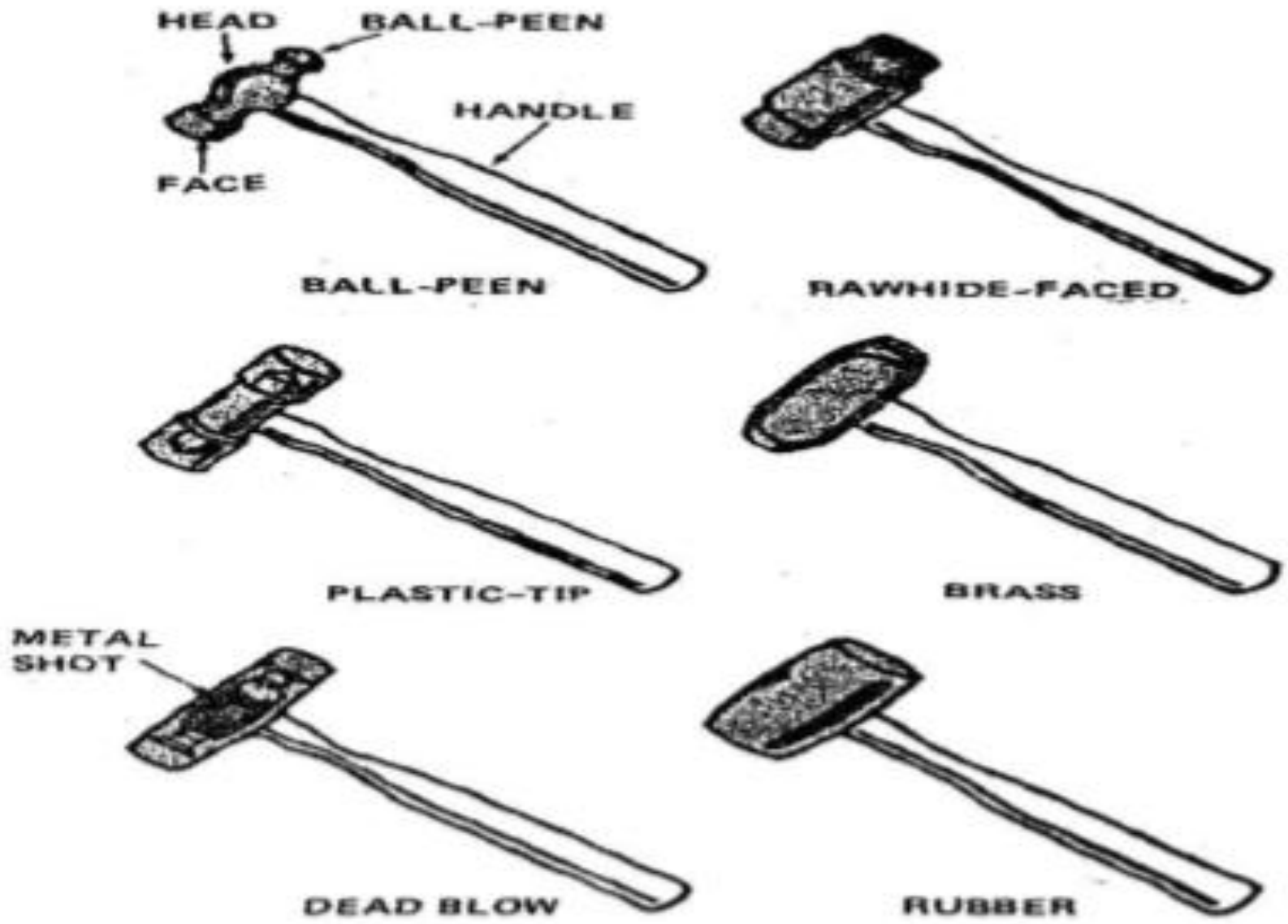
KIND OF TOOLS

- **DRIVING TOOLS EXMAPLE**
  - **. Hammers are generally used for driving or striking work. It comes in various sizes, weights, and kinds .Ball peen hammer is basically used by machinists as in automotive applications. It has a weighty ball-shaped metal at the end of the handle with flat surface on one side for striking a chisel or appropriate work and a rounded shaped for riveting or penning. The brass or plastic-tipped hammers are used for striking soft and delicate part such as aluminum or plastic to avoid danger of breaking or marring the surface.**

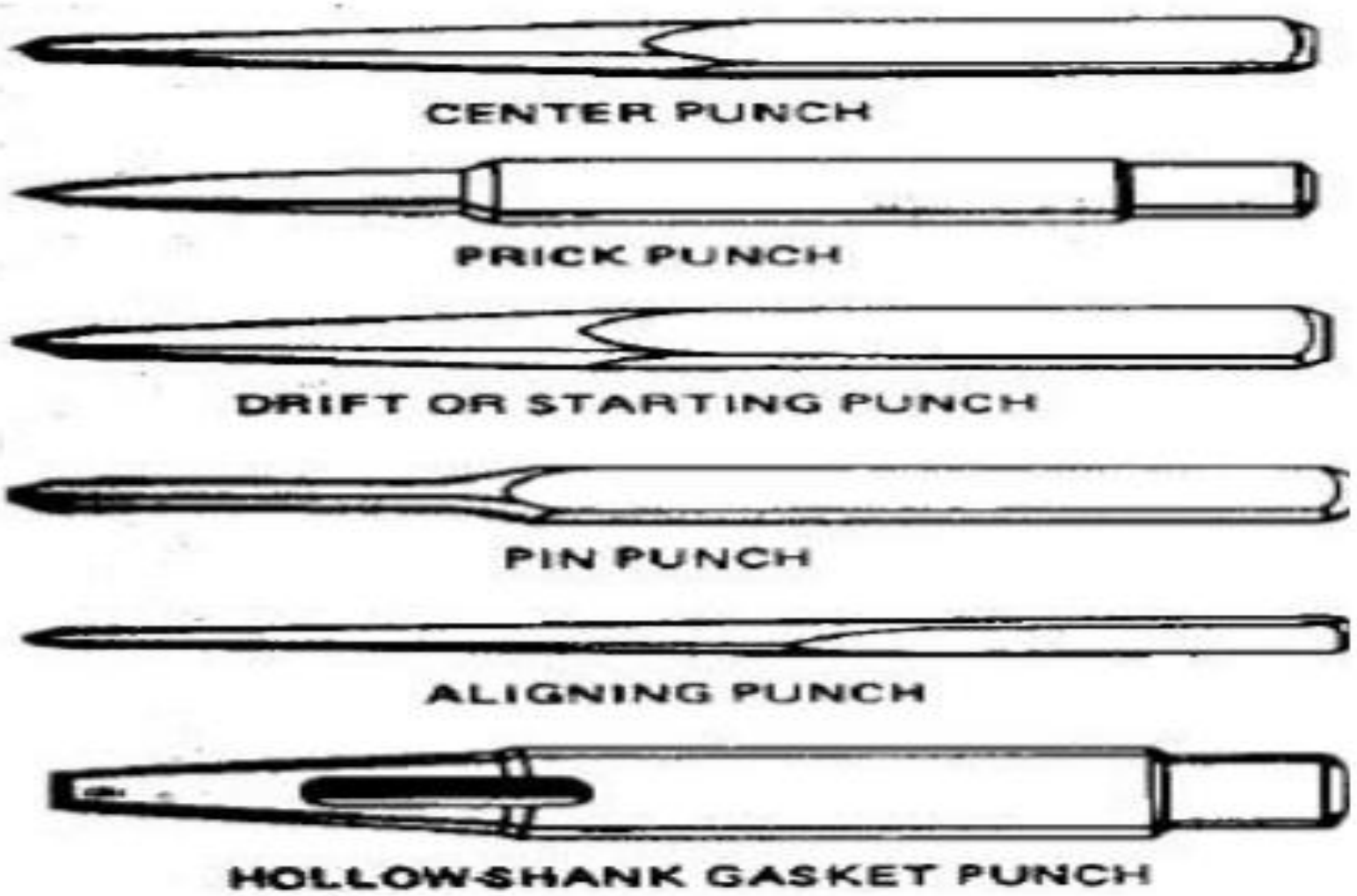
KIND OF TOOLS

- **DRIVING TOOLS EXMAPLE**
  - **. Puncher is a tool made of steel. It is used to cut or drive outa bolt or lock needle pin out of a hole. Starting punch is a punch with tapered portion used for initially starting a pin or rivet removal. After initially starting the pin, the drift punch or pin punch is used to complete the job of removing the pin. A hole punch is used in cutting a paper gasket in making holes.**

a. Hammer – the most commonly used for striking purposes.



d. Punches – used to knock out rivets and pairs.



KIND OF TOOLS

- **LOOSENING AND TIGHTENING TOOLS**
  - **Wrenches are tools for loosening and tightening of bolts and nuts. It comes in different forms and number in Metric or in English sizes.**
    - **Allen wrench is used in a type of screw bolt with a hexagonal hole on the head.**
    - **Box end wrench is an enclosed end tool used for moderate application for loosening and tightening bolts and nuts.**

KIND OF TOOLS

- **LOOSENING AND TIGHTENING TOOLS**
  - **Wrenches are tools for loosening and tightening of bolts and nuts. It comes in different forms and number in Metric or in English sizes.**
    - **Combination wrench is a tool with an open-end on one side and box-end on the opposite side. It has the same size on both ends and used in loosening and tightening bolts and nuts.**
    - **Oil filter wrench is a circular-shaped steel with internal tooth and handle. It is inserted to the oil filter body, tightened as it is turned for removal.**

KIND OF TOOLS

- **LOOSENING AND TIGHTENING TOOLS**
  - **Wrenches are tools for loosening and tightening of bolts and nuts. It comes in different forms and number in Metric or in English sizes.**
    - **Open end wrench is a tool with open end used for light application in loosening and tightening bolts and nuts.**
    - **Socket wrench is a tubular-like tool with an enclosed end used for heavy application for loosening and tightening bolts and nuts.**

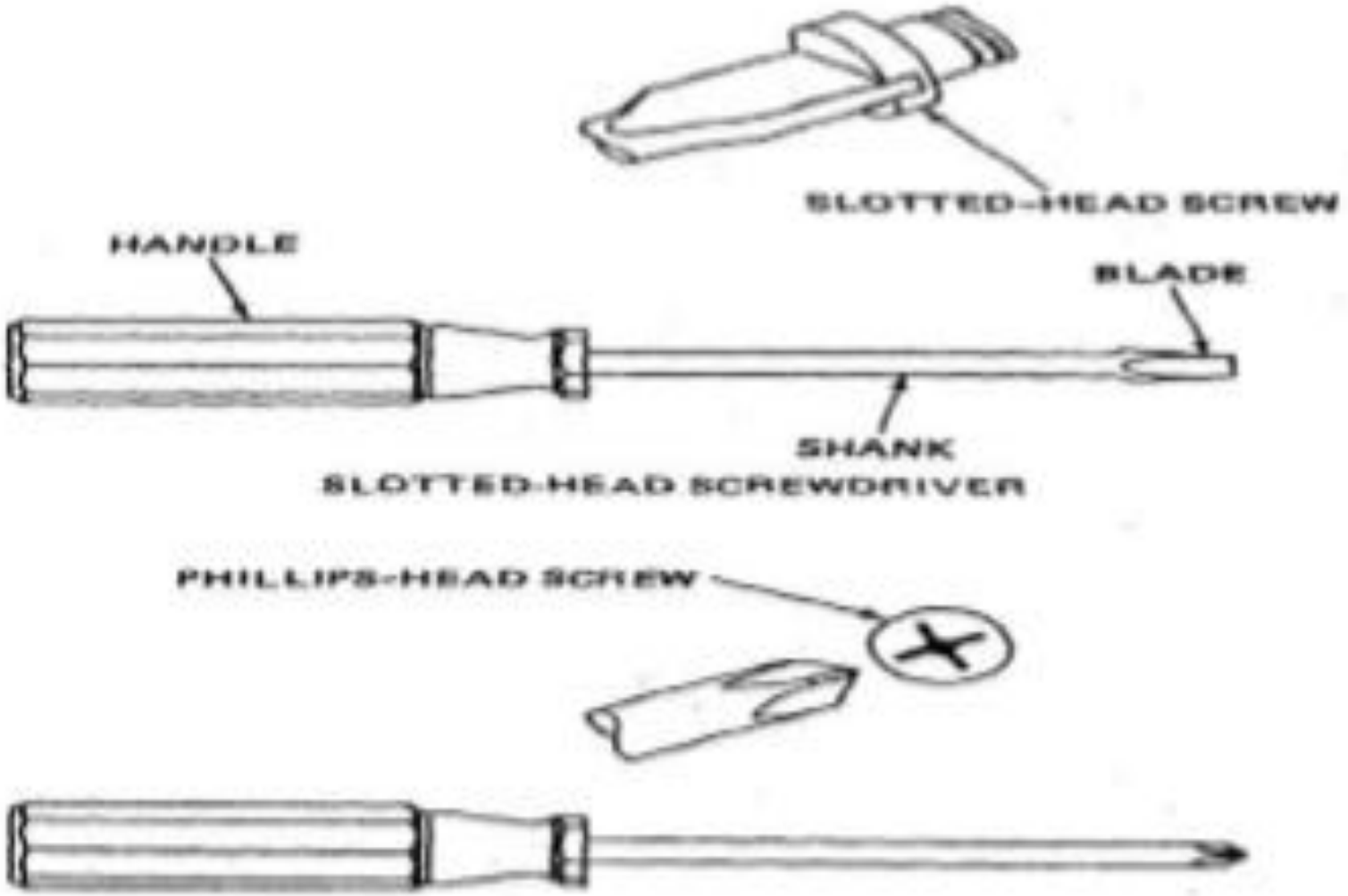
KIND OF TOOLS

- **LOOSENING AND TIGHTENING TOOLS**
  - **Wrenches are tools for loosening and tightening of bolts and nuts. It comes in different forms and number in Metric or in English sizes.**
    - **Tire wrench is a cross-like or sometimes L-shaped piece of round bar used to remove the wheels of the vehicle.**
    - **Spark plug wrench is a socket-like wrench intended for removing and installing spark plugs.**

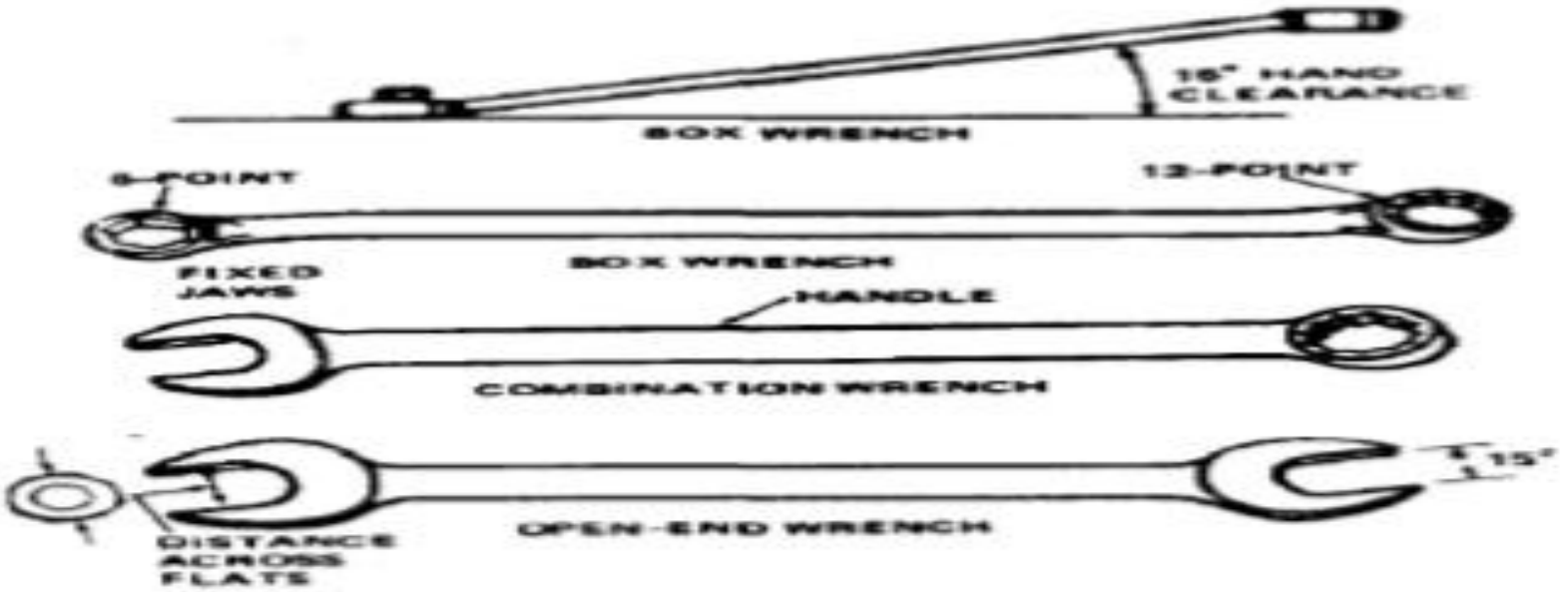
KIND OF TOOLS

- **LOOSENING AND TIGHTENING TOOLS**
  - **Screwdriver is a piece of long metal rod made of hardened steel and tempered at the tip. It is used to loosen and tighten screws. It usually comes in different sizes and forms of tips. An Allen screwdriver has hexagonal sides at the tip and used for hexagonal slot head of the screws. A flat screw driver has flat tip at the end and used in a single groove screws. A Philips screw driver has cross-like tip at the end and used in a cross groove head of the screws. Depending on the kind of application used, a screwdriver can be of special types such as stubby screwdriver that has a short shank and handle. It is used for tight space where a typical screwdriver cannot be used. An offset screwdriver has a shank bent in opposite direction several distance just before the end of the tip. It is used to loosen and tightened screws in difficult areas**

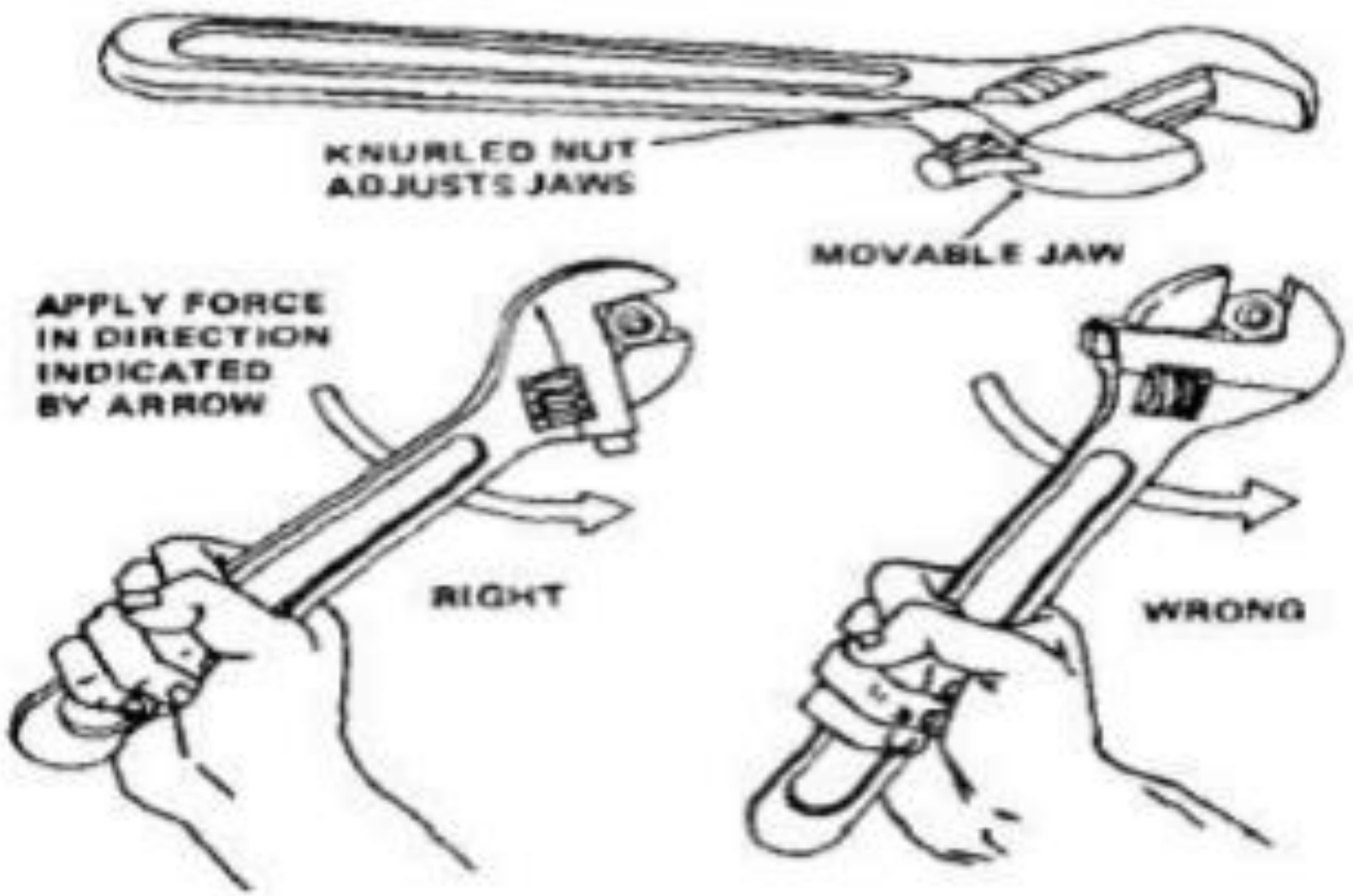
a. Screw Drivers – used for driving and turning screws

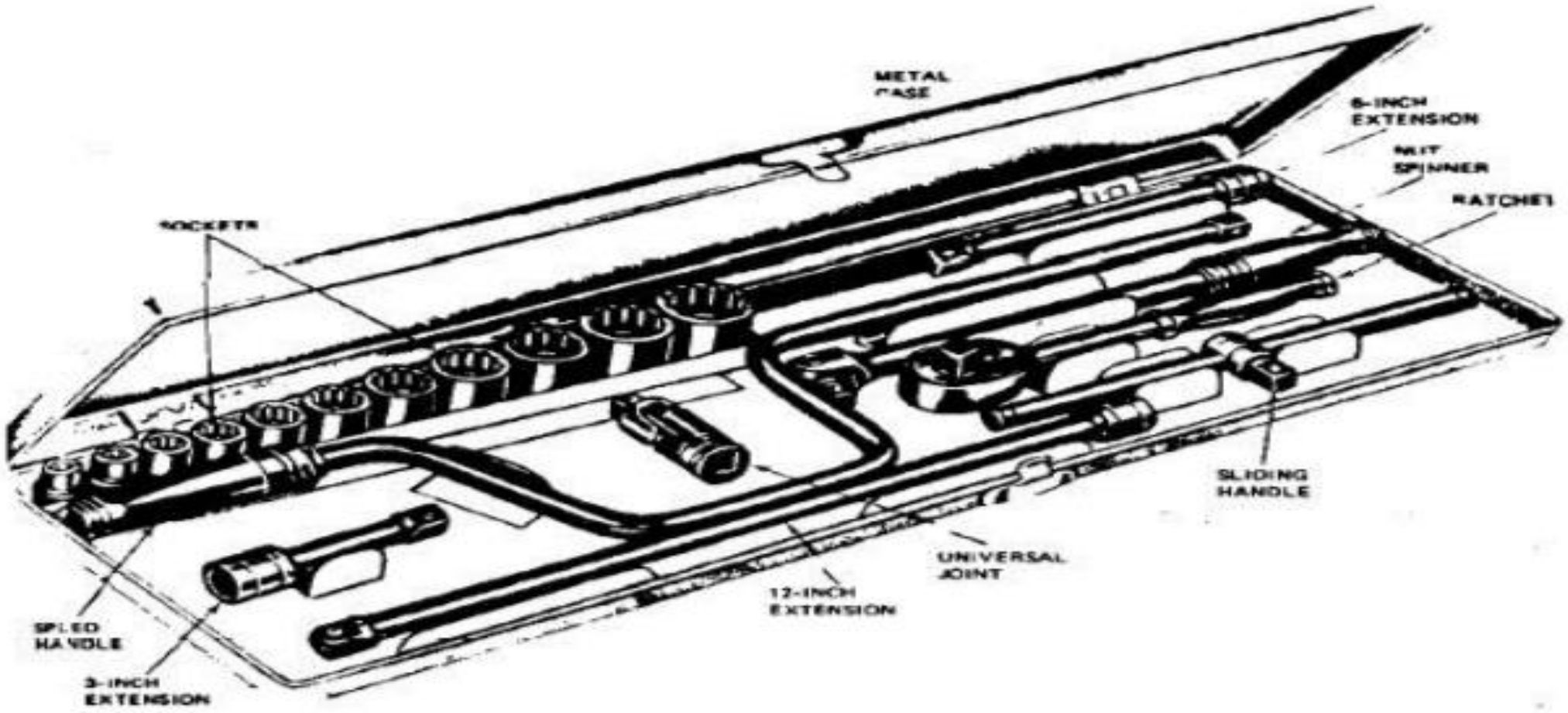


Types of Wrenches

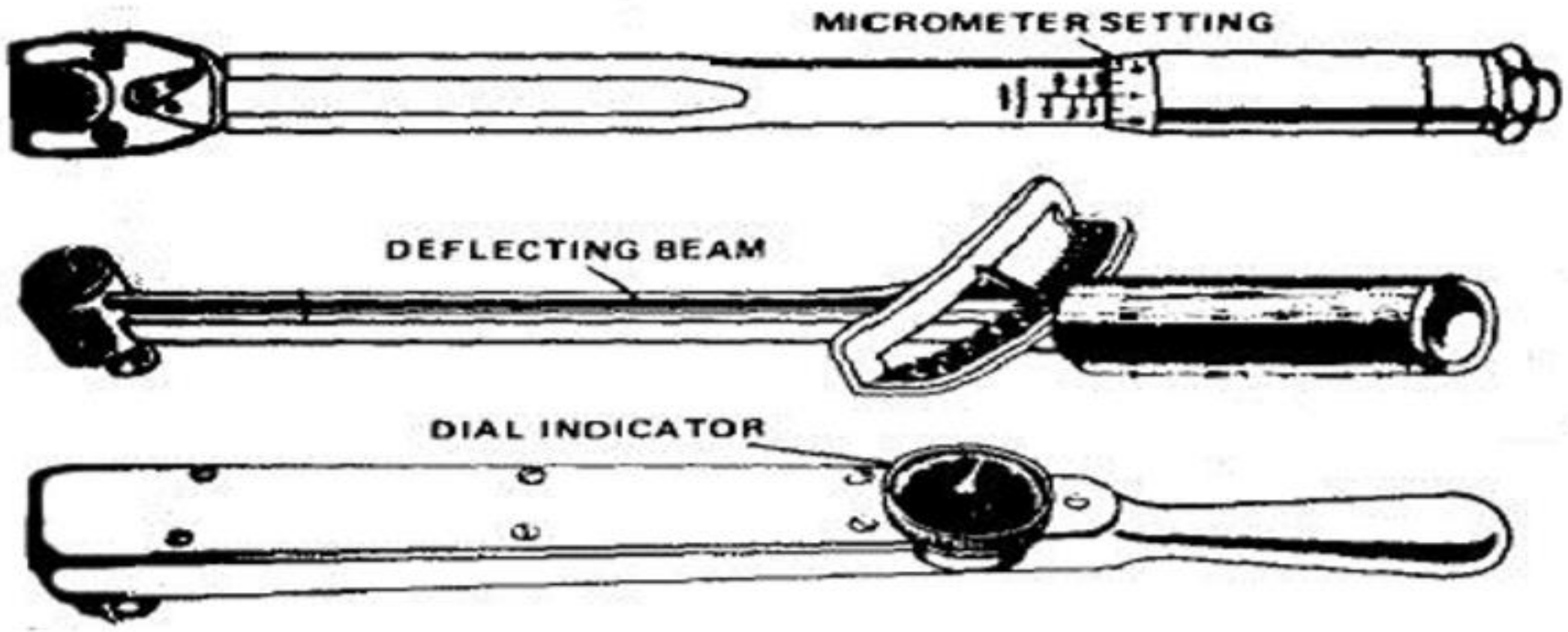


Flare nut wrench





Set of Socket wrench



Types of Torque Wrench

KIND OF TOOLS

- **MARKING TOOLS**
  - **Center punch is a tool made of hardened steel with conical tip point on its end. It is about 3 to 4 in. long in length and used for marking the material before drilling. It is also used for marking two parts so that after removing, it can be easily replaced by aligning the marks together**
  - **Scriber is a thin steel rod with pointed tip on its end. It is used for marking fine lines on metal for layout work.**
  - **Pencil is a thin strip of graphite enclosed in a wooden case and used for making drawings and marking lines**

KIND OF TOOLS

- **MEASURING TOOLS**
  - **Torque wrench is a special service tool for measuring the twisting force applied when tightening bolts and nuts. Scriber is a thin steel rod with pointed tip on its end. It is used for marking fine lines on metal for layout work.**
  - **Steel rule is a measuring strip of steel available in various lengths in metric and English system. It is available in 12, 24, 36 and 48 inches size. It is used in linear measurement of short length or height.**
  - **Caliper is a tool used in measuring the diameter of a circular work. The Inside caliper is used in measuring the inside diameter whereas the outside caliper is used in measuring the outside diameter of an object. The caliper is adjustable. The Vernier caliper is a good example that is capable to measure both the inside and outside diameter of an object with accuracy. It can also measure the thickness and thinness in thousandths of an inch.**

KIND OF TOOLS

- **MEASURING TOOLS**
  - **etal tape measure is a push and pull, long strip of thin sheet of metal with corresponding increments in millimeter and inches graduation. It is used for measuring stock and can be bought in different sizes of length. 5. Feeler gauge is a thin strip of metal with different thickness used to measure or set gap and clearance between parts of mechanism.**

COMMON FAULTS OF TOOLS

- A hand tool is the best friend of every serviceman. With it, work becomes easy and efficient. But, if tools are not given careful attention they will easily give up without maximizing its usefulness. If this condition continues, it will result in a faulty condition. This faulty condition results from ineffective use which eventually might create the risk of danger and accident. Common faults of hand tools are usually blamed on manufacturer's defect. However, it doesn't mean that whenever hand tools become faulty or defective, the manufacturer always carries the responsibility.

COMMON FAULTS OF TOOLS

- **Metal fatigue is one of the usual causes of faulty hand tools specially those that are made from steel. Like human body that sometimes needs rest, metal fatigue is developed from overuse of tools. It can also result from too much imposition of force on tools which is less than its capacity to endure. It will render the tools unserviceable.**

COMMON FAULTS OF TOOLS

Because of wrong habits or attitudes, human error also contributes to faulty hand tools. Wrong use of tools for the job will create bad effect on the tools. A screwdriver which is intended for loosening and tightening screws becomes defective and reduces its usefulness when used like cold chisel.

Natural tear and wear causes tools to widen or reduce its size. A slack is noticeable when a box wrench for removing the bolt becomes loose when the internal sides of the wrench is bigger than the external sides of the bolt‟s head. If used in this condition, both the bolt and the wrench will develop fault.

Tools not kept, not maintained, and unused will become rusty. Tools with jaws become difficult to operate. It will take time cleaning and removing the corrosion before it becomes functional.

SPECIFIC FAULTS OF TOOLS

- **Cleaning tools. Wire and fiber brush must be tightly fit and securely intact on its recess. Frayed brushes indicate overuse. Bristles can easily be removed and may splatter. They can pose danger to the eyes and skin. Likewise, dirty rags can create dust and affect the respiratory system.**

- **Bending/ Cutting/ Holding/Twisting tools. Overused, dulled teeth cutting edge of tools such as hacksaw, tin snip and cutter pliers will reduce time and work performance. Loose hacksaw blade to frame must be repaired or replaced at once. Dulled teeth and loose pivot lever of holding tools such as machinist and combination pliers lessen the grip and reduces its holding power. As a consequence, it will result in slippage. Pliers‟ teeth and its cutting edge must be reconditioned or must be replaced. Mushroom- headed cold chisel can cause danger when driven with a hammer. The driving force of a hammer may change direction due to the mushroom-like contusion on the head of the chisel. If this happens, body part is hammered rather than the object itself. Thus, injury is certain**

SPECIFIC FAULTS OF TOOLS

- **Driving tools. A swollen striking edge and loose hammer head handle can create a very devastating injury and fatal blow when the head flies out of its handle and hits a delicate part of the body.**
- **Loosening and tightening tools. A slacked wrench or screwdriver is a product of overused or wrong sized tool when forcefully used. Incorrect position of tools or the person doing the job will create an unbalanced force. When force is applied, the possibility of accident may happen. There is also a tendency of slippage when the surrounding sides of the wrench don"t fit squarely with the sides of the bolt or nut being removed or tightened. Therefore, this kind of fault must be addressed right away and the wrench or screwdriver be replaced at once**
- **Marking tools. A bent and dulled tip of marking tool will not give accurate marking. A dulled tip creates blurred lines; therefore, interpretation of lines and dimensions are not precise This must be corrected at once. Sharpen tools with the use of an appropriate sharpening gadget**
- **Measuring Tools. A measuring tool must be always kept clean. Dirty, bent, and creased measuring tools like measuring tape, steel rule, and caliper will give inaccurate reading if the gradation lines are not readable.**

SAFETY REQUIREMENTS OF HAND TOOLS

Hand tools come in different sizes, shapes, weights, brands, and designs. These characteristics of hand tools are very important because they give us technical data about their production. These technical data will enable us to know the capacity of tools if subjected to the degree of use. The standard requirements of tools for use and safety are very important on the part of the buyer as well as the user. Without them, they have no bearing at all if not assured with safety features. Tools are engineered and designed to numerous sequence of events when used within the normal working range. To use a tool appropriately, know its safety requirements, to be guided accordingly when you purchase one.

Tools produced in the industry must pass the Work Equipment Law. In this law, procedures on the extent, fitness, correctness, and usability of tools and equipment are provided in accordance with specified task. This ensures safety standards before tools are released in the market.

SAFETY REQUIREMENTS OF HAND TOOLS

The following are some of the information you need to know about the safety requirements of hand tools:

1. **Technical data. This will give information about the manufacturer's specifications of the tools produced. The size, weight, production code number, and the brand are usually marked on the body of the item**

2. **User's manual. It tells where, when and how the tools are to be used. It also gives information on the limitation of tools if subjected to constant use. In this manual, users are given warning on the possible injury one may get if used incorrectly. It also gives detailed information on how tools are maintained and stored. If tools need to be assembled, the manual gives a step-by-step instructions on how to do the task.**

SAFETY REQUIREMENTS OF HAND TOOLS

3. Physical requirements. Physical requirements of tools have bearing on how they are manufactured. Their good quality must be:

- **a. Tensile strength. Tools must belight but durable so that excessive forcein using them is not necessary. In this manner, strain on hands and shoulders are reduced. A tool must be strong and reliable to stand the stress of constant use. Tooth edge of hacksaw and chisel must be tempered and so with a screw driver.**

- **b. Powerful. Tools must not be heavy on the hand side rather than on the end portion of the driving force, as in a hammer. They must be considerably long to give a powerful twisting force as in a wrench and screw or a heavy blow when using hammer. This reduces muscular effort and efficiency of work is achieved.**

- **c. User- friendly. Tools must be easy and comfortable to use. They must be hand-fit and oval or cylindrically shaped. A square-shaped handle creates discomfort on palms because of the edge area**

SAFETY REQUIREMENTS OF HAND TOOLS

d. Safe Tools must have gripping surface on their handles to assure holding power and avoid slip that may lead to injury. Stopper must also be on pointed and sharp-bladed/edged tools. Driving tools must be provided with appropriate length of grip

Functionally Accurate. Tools are especially made to measure like torque wrench. Vernier caliper and feeler gauge must be technically and functionally accurate. They must give correct reading of division and sub-division of their fractional value or scale. Inaccurate reading gives wrong data or information and may result in severe damage to parts