Automotive Hand tools

General Safety

Safety in automotive workshops is everyone’s responsibility. It means protecting yourself and others from injury at all time. Working in an automotive workshop requires the use of a variety of tools and equipment that can injure others if not handled properly.

The most common injuries are to the hands and fingers. Using the correct tool is an important way to avoid injuries.

Spanners

There are many different types of spanners, all of them designed to loosen or tighten bolts and nuts. All spanners are marked so that the size of their opening can be known, but there are different ways of doing this. The manner in which the size is written will tell you the series of the nut or bolt for which it was designed. It is very important to use the correct spanner for the job at hand.

By doing this you will avoid injuries caused by the spanner slipping from the bolt or nut. In Australia we use one of three possible measurements:

- A.F spanners which are designed for American or Unified bolts and nuts marked in inches.
- B.A and B.S spanners which are designed for a British series of bolts and nuts.
- MM spanners designed for use with the metric series bolts and nuts. If you measure a spanner marked 15 mm with a millimetre ruler it would measure 15 mm between the jaws.

Socket Spanners

Socket spanners are the most useful of all the different types of spanners. You should always use a socket spanner in preference to any other spanner. They are faster to use and because they can not slip off a bolt they are safer to use. A set of socket spanners consists of a range of sizes and types of socket: different types of handles, different lengths and extensions. The universal joint allows the drive between the socket and handle to have some kind of flexibility.

Socket sets are identified by size as follows: ¼", 3/8", ½", ¾", 1" and 1½". Socket set size refers to the size of the square end of the socket, the extensions and the handles.
The ¼” square drive is used for light and delicate work in close quarters eg. Ignition and carburettor fittings.

The 3/8” square drive is the most convenient socket set. It can be used for small engines including scooters and motorcycles, as well as almost all cars and light truck work.

The ½” socket is heavy and should only be used for heavier work where a 3/8” can not loosen a bolt or is unsuitable.

There are also many different types of sockets including double hexagon or twelve point sockets, single hexagon or six point sockets, double square or eight point sockets, deep sockets and flex sockets.

The socket spanner also comes with a range of handles:

- **Ratchet** - used for small socket handles especially ¼”, 3/8” and ½” drive sockets. The ratchet makes it possible for the nut to be turned without having to lift the socket from the nut. You should not use this handle if the bolt is very tight.
- **Swing Handle** - used to loosen and tighten nuts and bolts which require great pressure than is available with the ratchet.
- **Extensions** - enables the handle to be used in a convenient situation.
- **Handle Adaptors** - are used to change the size of the square drive on the handle so the sockets of different size may be used with the same handle.
- **Torque spanners** - the special handles make it possible to tighten a bolt or nut a definite amount.

**Other types of spanners**

- **Open End spanners** are sometimes called flat spanners. They are easy to use but not as quick as the socket spanner. You must take care when using this spanner and ensure the correct size is used otherwise injury will occur to the users hands.
- **Ring Spanners** are very strong but slow to work with. There is no danger in a ring spanner slipping if the right size is used. Ring spanners should be used when a socket set is not able to be used and the bolts/nuts are too tight.
- **Combination spanners** have an open ended spanner and a ring spanner at each end.
- **Adjustable spanners** are available in 100mm (4”) to 600mm (24”). They should only be used when the correct size of conventional spanner is not able to be used. Never use an adjustable spanner as a hammer! The spanner must be used with the jaws tightly around the bolt or there could be a risk of slipping and causing injury to the user.
Pipe Wrenches

Pipe wrenches are available in sizes 6" to 48" overall length. They are designed for tightening or loosening pipes, as well as for holding round objects. They should not be used with bolt heads or nuts. Remember the safety rule when using a spanner Pull Don’t Push.

Pliers

Slip joint pliers are the most commonly used pliers. They are used for general-purpose holding jobs. Most slip joint pliers have a two position joint which allows the jaws of the pliers to be opened extra wide so that large and small objects can be gripped.

- Diagonal pliers are often called diagonal cutters. They are used for removing ad inserting split pins as well as wire and split pin cutting operations.
- Snipe-nosed pliers are used for removing or inserting small spring clips, washers, wires etc.
- Interlocking joint gripping pliers are able to grip objects with a large diameter with great force due to their 9" length. The jaws are adjustable.
- Snap ring pliers are used for removing external snap rings.
- Vice grip pliers can be locked to an object and grip with great pressure.

Screw Drivers

Screwdrivers are meant to turn screws and should never be used as a Tommy bar. Mechanics would require a unbreakable, shockproof and plastic handle to avoid injury.

Hammers

Ball pein hammers are the most commonly used in power mechanic workshops. When operating keep your eye on the object you are hitting and not the end of the hammer. The ball pein hammer is mostly used for cutting out gaskets.
Punches and Chisels

- A centre punch is used to mark a metal piece for assembly or to centre a drill piece.
- The taper or starting punch is used for the initial breaking loose of pins and bolts which are to be driven out of a hole. The diameter of the tip indicates the size of the taper punch.
- The drift or pin punch is used to complete the driving out of a pin which has already been broken loose by a taper punch.
- Cold Chisels are occasionally used in mechanics with split nuts which can not be turned or nuts which are stripped.

Identified Risks and Hazards

Hazards that may arise when working in an automotive workshop are:

- moving or breaking parts (blade disintegration)
- movement of the work piece
- broken bones - using the wrong hammer for the job and smashing a finger.
- cuts and puncture wounds to the hands
- loss of eye/vision - using striking tools without eye protection.
- severed fingers, tendons and arteries - using sheet metal tools
- slip, trip and fall accidents

The greatest hazard posed by hand tools result from misuse and poor maintenance.

Example of misuse include:

- using a screwdriver as a chisel
- loose hammer head on the handle
- over exertion when using a items of equipment

Always use a hand tool for the job it was manufactured to perform. Avoid boisterous behavior; never run, always walk at a suitable pace. Watch where you are going – avoid bumping into other students. Do not carry sharp tools or objects in your pockets or apron.

Operating Safety

Hand tools are responsible for the majority of accidents in the workshop. For this reason there are a number of safety rules to be followed:

- Never run or fool around in the workshop.
- Carry cutting tools with the sharp edge pointing down.
- Keep your whole body behind the cutting edge of tools.
- Always remember that saws and chisels cut fingers easier than they cut metal.
- Put all unused tools back in the storage rack where they belong.
- Use the correct tool for the correct purpose.
• Tools kept in good condition help produce a good accurate job.
• Be sure handles are fixed firmly into a tool's working end. e.g. files
• Never use a hand tool without a handle.
• Strike a hammer with the face parallel to the surface being struck. Glancing, off-centre blows can throw dangerous fragments into the air.
• Replace cracked, splintered, or broken handles on files, hammers and screwdrivers.
• Never use a hammer with a loose fitting head.
• Cutting tools should be kept sharp to ensure good smooth cutting.
• Screwdriver points should not be badly worn and handles should be in good condition. Use the proper size and type of screwdriver for the job.
• Always adjust, repair or inform the supervisor of damaged or blunt tools.
• Never strike two hammer heads together. They may shatter.
• Do not apply excessive force or pressure on tools. eg. hacksaw
• Do not cut towards yourself when using cutting tools.
• Do not hold the stock in the palm of your hand when using cutting tools such as the hacksaw.
• Do not throw tools. Hand them, handle first, directly to other workers.
• Secure your work with a clamp or in a vice whenever possible. Never hold small work in your hand when using a screwdriver.
• Screwdrivers or other pointed tools should never be carried in clothing pockets.
• Keep the work environment clean and tidy to avoid clutter which may cause accidents.
• Always wear the PPE required for the job. Protect your eyes, hands, ears and other body parts.