



Carpentry

Level-II

Learning Guide-24

Unit of Competence: use carpentry hand and power tools

Module Title: using carpentry hand and power tools

LG Code: EIS CRP2 M06 LO3-LG-24

TTLM Code: EIS CRP2 M06 TTLM 0919v1

LO3: Use tools

Instruction Sheet	Learning Guide #1
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Carpentry L II	September 2019	Page 0 of 36
Version I	Copy right: Federal TVET Agency	



This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Using appropriate Hand tools
- Using Power and pneumatic tools safely and effectively
- sharpening and maintaining Tools
- Locating fastener and charge in EPT
- Carrying out EPT operation and fixing fastener

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, **upon completion of this Learning Guide, you will be able to:**

- 3.1. Hand tools are used appropriate to the task and materials and are in accordance with OH requirements.
- 3.2. Power and pneumatic tools are safely and effectively used in accordance with manufacturer recommendations and state or territory OHS requirements.
- 3.3. Tools are sharpened and maintained according to manufacturer recommendations.
- 3.4. Fastener and charge in EPT are located to manufacturer specifications.
- 3.5. EPT operation is carried out and fastener is fixed into place in accordance with manufacturer recommendations, legislation, regulations and codes of practice.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, to Sheet 5”.
4. Accomplish the “Self-checks after each information sheet respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheets
6. Do the “LAP test”

Carpentry L II	September 2019	Page 1 of 36
Version I	Copy right: Federal TVET Agency	



3.1. Using appropriate Hand tools

- **Using Measuring tools**

- ✓ The blades on retractable tape measures draw back automatically when released so you must take care to avoid injury to yourself or damage to the blade.
- ✓ Folding rules should not be flipped open as this can cause injury to other people or damage to the rule itself.

- **Care and maintenance – Measuring tools**

- ✓ Avoid using tape measures in wet or damp conditions. If this is unavoidable, wipe metal blades with an oily cloth to stop them from rusting.
- ✓ Don't leave measuring tapes or rulers exposed for long periods to the direct rays of the sun, as they may buckle or degrade.
- ✓ When using tape measures in dusty or sandy conditions, don't let debris be retracted into the case, as this can cause damage to the retraction mechanism.
- ✓ Don't be rough with the blade or the tape housing on retractable tape measures, and always retract the blade gently. Don't let it 'fly' back in.

- **Operating tips – Squares and bevels**

- ✓ It's essential that you hold the stock firmly against the face/edge of the timber when you're marking lines to avoid moving the blade and creating lines that are 'out of square'.
- ✓ For greater accuracy, draw lines along the outside edge of the blade whenever possible.
- ✓ Draw lines slowly, and in a smooth, continuous stroke. Don't apply too much pressure to the pencil/pen.

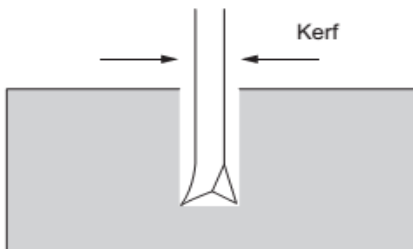
- **Operating tips – Gauges**

- ✓ If you don't hold the stock firmly against the timber, the spur can follow the grain. This will result in a wavy line. You can avoid this by pushing sideways with one hand while holding the end of the gauge between the finger and thumb of your other hand.
- ✓ Avoid digging the spur too deeply into the timber. You can produce a much straighter line if you scribe the timber lightly several times rather than making one deep scribe.



- **Operating tips – Saws**

- ✓ Hold the timber firmly in place when you're sawing. Use a vice, bench hook or a clamp if possible.
- ✓ Examine the timber (especially second-hand timber) for nails or screws, and clean any sand or dirt from the timber before you cut it.
- ✓ Start a cut by placing your thumbnail alongside the pencil line on the timber to help steady the saw blade. Draw the saw blade back a few times to help the saw start in the correct position, then move your thumbnail away from the saw blade before you cut.
- ✓ Hold the saw handle firmly. Extending your index finger along the side of the handle will give you more control.
- ✓ Use the full length of the saw blade to avoid excessive wear on the teeth in the middle of the saw blade.
- ✓ The teeth on a saw are 'set'; that is, they're bent slightly away from the centre line of the blade to allow the width of the cut (called the kerf) to be slightly wider than the width of the blade.



If you don't create this extra space, the saw will jam when timber fibers on each side of the cut spring back against the blade. This can cause you injury and damage to the blade. The kerf should be about 1.5 times the thickness of the blade.

- **Operating tips – Hammers**

- ✓ Select the correct hammer for the task to be undertaken.
- ✓ Hold the hammer near the bottom of the handle. Don't 'strangle' it by holding its neck near the head.
- ✓ When you're using a hammer to drive nails, both your elbow and your wrist should be moving. A stiff wrist will produce a less effective tapping action and hurt your arm.
- ✓ When driving a nail into something that is not solid or could move easily, eg thin timber, hold something heavy against the back of the object such as a gypie or sledgehammer. This is called a 'dolly' and it will absorb the force of the hammer blows and steady the job.

Carpentry L II	September 2019	Page 3 of 36
Version I	Copy right: Federal TVET Agency	



- ✓ If you put a piece of plywood beneath the head of the hammer when you're extracting nails, this will prevent damage to the timber surface.

- **Operating tips – Screwdrivers**

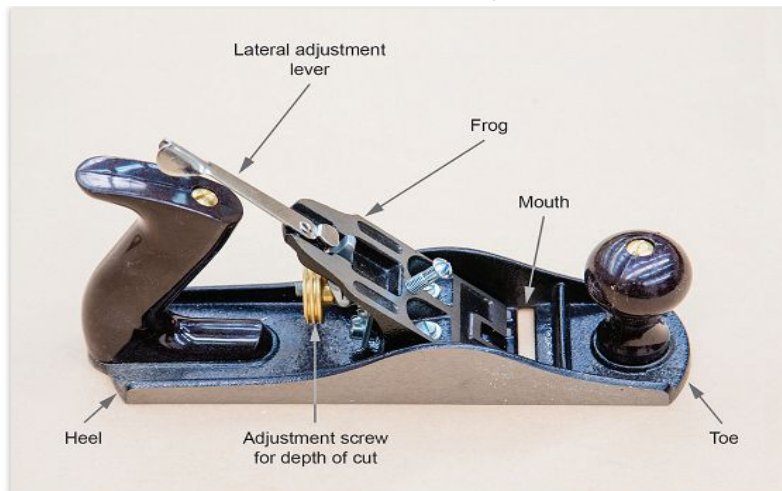
- ✓ Always use a screwdriver that matches the size and type of screw.
- ✓ To avoid slippage, keep the screwdriver directly in line with the screw being driven.
- ✓ Avoid using excessive force by allowing the thread to draw the screw into the timber.
- ✓ Screwdrivers shouldn't be used for activities like prising nails, chiseling or stirring paint. Never use pliers to turn a screwdriver as they can damage the screwdriver, the screw and the material.

- **Operating tips – Planes**

- ✓ Always plane timber in the direction of the grain. This will minimize the risk of tearing the face of the timber.
- ✓ Make sure that you locate any nails or screws below the surface of the timber well before you start planing.

- ❖ **Parts of hand planes.**

- ✓ Frog– the part that the blade assembly is mounted on; it can be adjusted fore and aft (forwards and backwards) so that the cutter is positioned over the mouth.
- ✓ Mouth– the slot in the base of the plane through which the cutter protrudes.
- ✓ Adjustment screw for depth of cut– the nut located behind the frog that controls the amount of cutter that protrudes beneath the body of the plane.
- ✓ Lateral adjustment lever– enables the cutter to be tilted to the left or right so that it protrudes evenly beneath the plane body.
- ✓ Toe and heel– the front and back of the plane.

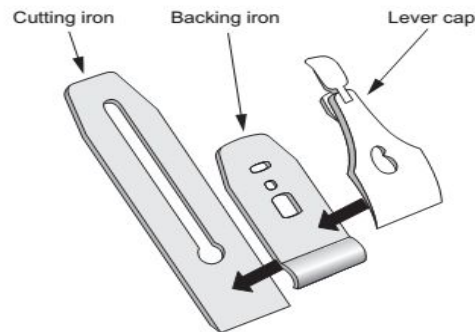


Carpentry L II	September 2019	Page 4 of 36
Version I	Copy right: Federal TVET Agency	



- **The cutter assembly**

The heart of any plane is the cutting iron (also called the blade or the plane iron) which does the cutting. It's attached to the backing iron which has a small slot near the top that allows the lateral (sideways) adjustment of the cutter. The lower end of the backing iron has a curved bump and, as the cutting iron slices a shaving from the surface of the wood, this bump forces it to curl away from the cutting edge and break into shavings. The lever cap holds the cutting and backing iron assembly firmly to the frog.



When you're reassembling a plane after the cutting iron has been stripped down and sharpened, it's important that you put the individual parts together the correct way. The bump on the backing iron and the bevel on the cutting iron must be opposite one another.

- ❖ **Operating tips – Chisels**

- Strike chisels only with a mallet. Avoid striking them with a hammer as this can Cause damage to the chisel handles.
- Check timber for knots, staples, nails, screws or other foreign objects before Chiseling, to avoid damaging the cutting edge.
- Use a vice or clamps to hold the timber securely while you're chiseling.
- Operating tips – Shaping tools
- Use files by pushing the file forward across the timber rather than dragging the file backwards (which can cause damage to the teeth).
- Always hold a spoke shave in both hands and push it away from your body.

- ❖ **Operating tips – Boring tools**

- To ensure that the drill bit doesn't slip and damage the material being drilled, use a centre punch or bradawl to start a hole in the material before you drill.
- Clamp the work piece to avoid unwanted movement during drilling.
- To avoid splitting the timber when drilling, either clamp a block onto the timber where the bit will emerge or drill from both sides.

Carpentry L II	September 2019	Page 5 of 36
Version I	Copy right: Federal TVET Agency	



Self-Check -1	Written Test
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Directions: Choose the correct answer for all the questions listed below. Use the Answer sheet provided in the next page:

1. It cannot be used for taking measurement more than 3m
 - A. Folding rule
 - B. Tape rule
 - C. Wind up tape rule
 - D. None
2. For which of the following operation is not mandatory of using vice or clamp
 - A. Chiseling of stock
 - B. Sawing of stock
 - C. Measuring stock
 - D. Planing stock
3. The width of the cut on the sawed timber is called
 - A. Teeth
 - B. Kerf
 - C. Bevel
 - D. Rip cut
4. The part of the hand plane it is the slot / hole in the base of the plane through which the cutter protrudes
 - A. Frog
 - B. Toe
 - C. Mouth
 - D. Heel

Note: Satisfactory rating - 3 and 5 points

Unsatisfactory - below 3 and 5 points

You can ask you teacher for the copy of the correct answers.

Carpentry L II	September 2019	Page 6 of 36
Version I	Copy right: Federal TVET Agency	



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Multiple choice Questions

1. -----

2. -----

3. -----

4. -----



Information Sheet- 2	Using Power and pneumatic tools safely and effectively
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3.2. Using Power and pneumatic tools safely and effectively

❖ Operating tips – Power drills

- Don't put the motor under excess stress by forcing the drill. Allow the thread to pull
- The bit into the material.
- To avoid splitting the timber when drilling, either clamp a block onto the timber
- Where the bit will emerge or drill from both sides.

❖ Operating tips – Power saws

- Always keep both hands on the saw, if possible.
- Hold the saw only by the handle and the front knob.
- The waste timber should be to the right of the saw so that the widest part of the
- base plate rests on the timber

❖ Drop saw

Drop saws (also known as chop saws or miter saws) are a variation of the portable power saw. They consist of a blade and a motor which is mounted onto a short portable bench. They are widely used by 'second fixing' carpenters (carpentry carried out after the plaster has been applied to the walls) for cutting skirting, architraves, etc. The cut is made by pulling a trigger on the handle and 'dropping' the saw blade down into the work piece. Most drop saws are fitted with a clamp for holding the timber against the fence. The blade can be set square to the fence or swiveled up to 45° on either side. It can also be tilted to produce beveled and compound cuts.





❖ Cuts in different adjustment

Drop saws have a number of adjustments which enable them to perform a variety of functions including the following.

- **Rip cut:** the way of cutting the work piece along the grain direction, at 90° to the end of the stock
- **Cross cuts:** at 90° to the edge of the work piece, made with the table set at 0° .



- **Angled crosscuts:** made by adjusting the table to the required angle. The table should be rotated to the required angle and locked firmly into position.



- **Beveled cuts:** made by setting the table to 0° and tilting the blade to the required angle (between 0° and 45°) and locking firmly into position.



❖ Operating tips – Drop saw

- When you're performing compound or beveled cuts, take particular care to prevent the blade from coming into contact with your fingers.
- Always maintain a firm grip on the handle.

❖ Operating tips – Power sanders

- Don't apply excessive pressure to the sander. The weight of the tool itself applies sufficient pressure to the job.
- Use a slow, gentle backwards and forwards movement. A common error made when using a power sander is to vigorously work the machine backwards and forwards. The

Carpentry L II	September 2019	Page 9 of 36
Version I	Copy right: Federal TVET Agency	



additional motion makes little difference to the 200 or so rotations per second produced by the machine, and scratch marks may be left on the timber surface.

❖ **Operating tips – Routers and trimmers**

- Once you've set up a router, do a 'test run' on a piece of waste material first to ensure it has been set up correctly.
- When planning narrow edges, you can keep the plane more stable if you attach the fence and keep it against the face of the timber.
- The cutting depth should never be more than half the width of the cutter.
- Operating tips – Pneumatic nail guns Some larger nail guns have a strong recoil, so you should always maintain a firm grip to ensure you have control of the gun.
- Don't rapid fire nails by continuously holding the trigger.
- Hold the work piece securely to avoid unwanted movement during nailing.

Carpentry L II	September 2019	Page 10 of 36
Version I	Copy right: Federal TVET Agency	



Self-Check -2

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Column A

1. It uses bit to operate
2. The blade and the motor mounted in a sort portable bench
3. Cutting the stock by tilting the blade between 0^0 and 45^0
4. Cutting the stock along the grain direction

Column B

- A. Power drill
- B. Rip cut
- C. Cross cut
- D. Drop saw
- E. Beveled cut
- F. Power sand

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Carpentry L II	September 2019	Page 11 of 36
Version I	Copy right: Federal TVET Agency	



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Matching Questions

1. -----
2. -----
3. -----
4. -----



3.3 sharpening and maintaining Tools

- **Care and maintenance – Chisels**

As a carpenter it's important to learn how to maintain chisels and the cutting irons in planes. Depending on the type of work you're carrying out, they may have to be regularly sharpened to ensure you're able to work safely and efficiently. You sharpen a chisel or cutting iron in two steps – grinding then honing.

- **Grinding**

Grinding involves holding the chisel or cutting iron against a grinding wheel until all defects have been ground away and the bevel on the chisel or cutting iron is at the correct angle (approximately 25°).

A chisel or cutting iron may need grinding if the cutting edge is damaged or blunt, or if the bevel has become too rounded for a sharp edge to be honed on to it.



Remember the following points when you're grinding a chisel or cutting iron.

- ✓ The tool rest must be set with clearance between it and the grinding wheel so that nothing can get jammed in the gap and cause the wheel to shatter.
- ✓ Hold the blade at a constant angle all the time. You can tilt the tool rest if you need to so that you can maintain a constant grinding angle.
- ✓ Dip the chisel or cutting iron in water every few seconds to help keep the blade cool, as metal will heat up quickly under the grinder.
- ✓ Keep the chisel or cutting iron moving across the edge of the grindstone at all times. This will help to wear the grinding wheel evenly as well as give a straight edge to the blade.
- ✓ Use a dressing tool on the grinding wheel periodically to ensure that the outer surface of the grinding wheel remains flat.
- ✓ Wear safety glasses at all times, even though the grinder has a safety shield.
- ✓ Remember the following points when you're grinding a chisel or cutting iron.
- ✓ The tool rest must be set with clearance between it and the grinding wheel so that nothing can get jammed in the gap and cause the wheel to shatter.
- ✓ Hold the blade at a constant angle all the time. You can tilt the tool rest if you need to so that you can maintain a constant grinding angle.



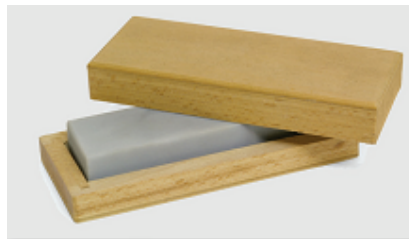
- ✓ Dip the chisel or cutting iron in water every few seconds to help keep the blade cool, as metal will heat up quickly under the grinder.
- ✓ Keep the chisel or cutting iron moving across the edge of the grindstone at all times. This will help to wear the grinding wheel evenly as well as give a straight edge to the blade.
- ✓ Use a dressing tool on the grinding wheel periodically to ensure that the outer surface of the grinding wheel remains flat.
- ✓ Wear safety glasses at all times, even though the grinder has a safety shield.

- **Honing**

Honing means rubbing a chisel or cutting iron on an oilstone to get a razor sharp edge on the tool.

- **Oilstones**

Oilstones are blocks of fine grained stone used to sharpen blades. They can be natural or synthetic.



Natural stones are cut from rock. Because they're soft and expensive, they're used by specialists only in the fine woodwork industry. Synthetic stones are usually made from aluminium oxide and have a coarse side and a fine side. Oilstones are porous and can become clogged with abraded (worn down) metal which makes them less effective. You can avoid this by using oil to float away the particles of metal. Some oils thicken over time and clog the stone so they may have to be soaked and washed in kerosene to remove the metal particles.

Diamond honing stones are becoming more popular. They're made of steel with diamond dust mixed in and can be used dry (no oil or water). Stones are available in several sizes but the most common size is 200 mm × 50 mm × 25 mm.

Remember the following points when you're honing a chisel or cutting iron.

- The honing angle should be about 5° steeper than the grinding angle (approximately 30°), so that only the front edge of the tool is honed.
- The chisel or cutting iron should be moved from side to side (across the oilstone) as well as back and forth. This will ensure that the oilstone wears evenly (remains flat). You can restore a worn stone to a flat surface by rubbing it on concrete.

Carpentry L II	September 2019	Page 14 of 36
Version I	Copy right: Federal TVET Agency	



- **Care and maintenance – Saws**

Regular maintenance will help the saw to perform at its best and will protect the operator from harm. A sharp saw is less likely to cause an accident than a blunt one.

- ✓ Avoid using saws in wet or damp conditions. If this is unavoidable, wipe the blade with an oily cloth to prevent rust. If rust forms on the blade or if a coating of sap builds up, clean it off with steel wool.
- ✓ Any build up on the blade will increase drag and make the saw harder and more dangerous to use. As with all tools, keep your saws clean.
- ✓ Protect the points of the saw teeth when the saw is not in use. This can be done by making a sleeve for the cutting edge of the saw from a length of PVC conduit.

- **Care and maintenance – Hammers**

- ✓ Hammers that show any signs or damage or defect should be repaired or replaced. Repairs should be carried out only by a qualified person.
- ✓ If nails bend while you're hammering, the face of the hammer may be dirty. Rubbing it on abrasive paper (sandpaper) or concrete will clean off build up such as sap or glue.
- ✓ If a hammer 'rings' when it's used, it could mean that the head is loose. You should make regular checks to ensure that the hammer is safe to use

- **Care and maintenance – Screwdrivers**

- ✓ Screwdrivers with rounded or damaged tips should be filed square. A rounded tip can slip out of the screw slot and cause injury to the user or damage to material.
- ✓ Screwdrivers should be stored in a rack or pouch to avoid damage and allow easy access.
- ✓ As with all tools, keep your screwdrivers clean.

- **Care and maintenance – Planes**

- ✓ Lay a plane on its side or on a block between uses to prevent damage to the cutting iron.
- ✓ Keep the sole (underside) and cheeks (sides) of the plane lightly oiled to prevent rust and reduce friction.
- ✓ Keep the cutting iron sharp. Ten minutes spent grinding and honing – the two processes involved in sharpening a cutting iron – is time well spent.

Carpentry L II	September 2019	Page 15 of 36
Version I	Copy right: Federal TVET Agency	



- **Care and maintenance – Shaping tools**

- ✓ The teeth on files and rasps can quickly become clogged with timber or metal shavings. This is called ‘pinning’ and it makes the file less effective. Use a wire brush to remove any waste material from the file or rasp.
- ✓ The cutting irons of spoke shaves are maintained by following the same procedure
- ✓ as that used with the cutting iron on a bench plane.

- **Care and maintenance – Boring tools**

- ✓ Clean away dust from around the gear wheel and pinions of the hand drill occasionally to avoid them getting blocked and jammed up.
- ✓ Oil the moving parts of the hand drill or ratchet brace to prevent rusting or seizing.

- **Care and maintenance – Holding and supporting tools**

- There’s no special care or maintenance required for holding and supporting tools such as different types of clamps and vices, just the standard considerations such as keeping them clean, and checking them before you use them to ensure they’re working properly.

Carpentry L II	September 2019	Page 16 of 36
Version I	Copy right: Federal TVET Agency	



Self-Check -3	Written Test
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Directions: Say True for the correct and False for the In correct for all the questions listed below. Use the Answer sheet provided in the next page:

1. Chisel and cutting iron are sharpen by using grinding
2. If the bevel of chisel or cutting iron is become too rounded, we can say that it is at a good conditions
3. When we are grinding the chisel , we hold the blade at a different angle all the time
4. Oilstones are flocks of fine grind stone used to sharpen blades
5. If a nail bend while you are hammering the face of the hammer may be dirty

Note: Satisfactory rating – 3 and 4 points

Unsatisfactory - below 3 and 4 points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

True or False Questions

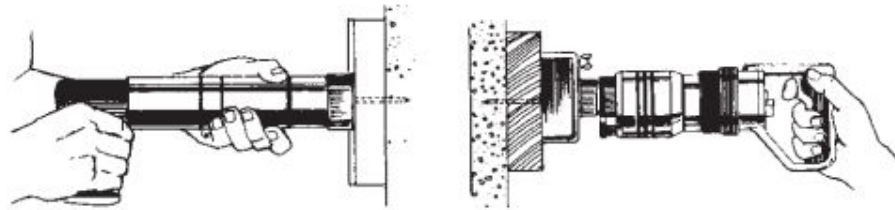
1. -----
2. -----
3. -----
4. -----
5. -----



3.4 Locating fastener and charge in Explosive power tool (EPT)

Explosive Powered Tools (EPT's) are to have the manufacturer's name, serial number, model number and misfire warning. Operators are to only use EPT for the purpose for which was intended and are to be trained in their use. EPT's should only be loaded at the place it is intended to be used and when ready for immediate use. Charges should be secured Never point an EPT loaded or unloaded towards yourself or others no matter the distance Fasteners used (pin, stud, dowel, screw, rivet, spike) should be as per stipulated by the manufacturer of the EPT During firing the operator and others in the area should wear suitable eye and hearing protection Ensure EPT is perpendicular to the work surface. Never fire an EPT on an angle

Explosive-actuated tools use an explosive cartridge or gas discharge to fire a fastener into hard materials such as concrete, mild steel, and masonry Used improperly, explosive-actuated (or powder-actuated) tools pose obvious hazards. The tools should be treated with the same respect as a firearm. Most jurisdictions—including Ontario—require that operators be trained before using the tools and carry proof of training on the job.



- **Hazards of EPT**

The followings are some of hazards that may occur during the operation of EPT

- ✓ **Flying Particles**

This is the major hazard. On impact, materials may break up, blow apart, or spall off. This often happens when fasteners are fired too close to a corner of masonry or concrete or when they strike materials such as glazed tile, hollow tile, or thin marble tile.

- ✓ **Ricochets:** - These usually result when the tool is not held at right angles to the base material, or the fastener hits a particularly hard material such as stone or hardened steel. Always check the type of material to ensure that it can safely accept the fastening device.
- ✓ **Noise:** - Explosive-actuated tools create an extreme pulse of sound when fired. This can create a noise hazard. The new Noise regulation (381/16) requires employers to assess the risk to workers of noise exposure and provide adequate controls to protect them. Hearing protection devices such as earplugs or earmuffs may be used if no other controls are appropriate. Operators of the explosive-actuated tool must be



protected from noise as well as other workers in the area—especially when the tool is operated in a confined space.

- ✓ **Sprains and Strains:** - These injuries usually result from using the tool repeatedly in awkward, cramped, or unbalanced positions. Operators should try to work from a balanced position on a solid surface.
- ✓ **Explosions:** - There is always the risk of explosion or fire when the tools are used in atmospheres contaminated by flammable vapor, mist, or dust. The work area must be ventilated—mechanically if necessary.
- ✓ **Blow-Through:** - When the base material does not offer enough resistance, the fastener may pass completely through and fly out the other side. This is particularly dangerous when fasteners penetrate walls, floors, or ceilings where others may be working. If necessary, keep areas behind, around, and under material clear of people. Fencing or barriers should be erected to prevent people from entering these areas.
- **Protective Equipment for EPT**

In addition to the standard personal protective equipment (PPE) required on construction projects (see the chapters on PPE in this manual), the operator of an explosive-actuated tool should wear hearing protection, eye protection, and a face shield. Heavy shirts and pants also provide some protection against ricochets and flying fragments of material and fasteners.

- **Tool Types for EPT**
- ✓ **High-Velocity Tools:** - High-velocity explosive-actuated tools use the expanding gases from the exploding cartridge to propel the fastener. The gases push directly against the fastener. These tools are rarely used in construction, except in special cases to penetrate thick steel or very hard material—they are usually used in military, salvage, or underwater applications. No one should operate high-velocity tools without special training.
- ✓ **Low-Velocity Tools:** - Most explosive-actuated tools used in construction are low-velocity. The expanding gases from the exploding cartridge push against a piston, which in turn drives the fastener into the base material many different low-velocity tools, are available, from single-shot models to semi-automatic models using multiple cartridges in strip or disk holders. Some tools are specific to one size of fastener or type of cartridge. Most can be fitted with various pistons, base plates, spall stops, and protective shields for different jobs.
- **Tool Components**
- ✓ **Pistons** Specialized pistons are available for different fasteners. Such pistons are designed for the fastener and should not be used with other types. Misusing a tool with a specialized piston can result in under- or over-driven fasteners or fasteners that leave the barrel misaligned, leading to ricochets. Some general-purpose tools can take various types of pistons.
- ✓ **Fasteners** used with explosive-actuated tools are made of special steel to penetrate materials without breaking or bending. Never use any kind of substitute for a properly manufactured fastener. Generally pins and studs should not be used on hard, brittle, or glazed materials such as cast iron, marble, tiles, and most stone. The fastener will either fail to penetrate and ricochet or the base material will shatter. Materials whose hardness or ductility is unknown should be tested first. Try to drive a pin into the material with a normal hammer. If the pin point is blunted or fails to penetrate at least 2 mm (1/16"), an explosive-actuated tool should not be used. Fasteners are invariably

Carpentry L II	September 2019	Page 20 of 36
Version I	Copy right: Federal TVET Agency	



fitted with a plastic guide device. Its purpose is twofold. When the fastener is inserted into the barrel, the guide keeps the fastener from dropping out. It also aligns the fastener inside the barrel so it will penetrate the base material at right angles.

There are two basic types of fasteners:

1. Pins
2. Studs.

Pins:- These are fasteners designed to attach one material to another, such as wood to concrete. They resemble nails, but there the similarity stops. Ordinary nails cannot be used as fasteners in explosive-actuated tools. Head diameters for pins are available between 7 mm (1/4") and 9 mm (3/8"). Lengths vary from 12 mm (1/2") to 76 mm (3"). Washers of various types and diameters are available for different applications. Pins should be selected for appropriate length, head size, and application. As a general rule, pins need not be driven into concrete more than 25 mm (1"). Using a longer pin is generally unnecessary and also requires a stronger cartridge. Follow the manufacturer's directions on length, penetration, and appropriate material. For example, one cut-nail fastener is available for fastening drywall to relatively soft base materials, but is recommended for virtually no other application. Testing may be necessary on some masonry materials that vary widely in hardness and durability.



Fig. types of pins

Studs:- These are fasteners consisting of a shank that is driven into the base material and an exposed portion to which a fitting or other object can be attached (Figure 40-4). The exposed portion may be threaded for attachments made with a nut. Studs are also available in an eye-pin configuration for running wire through the eye..

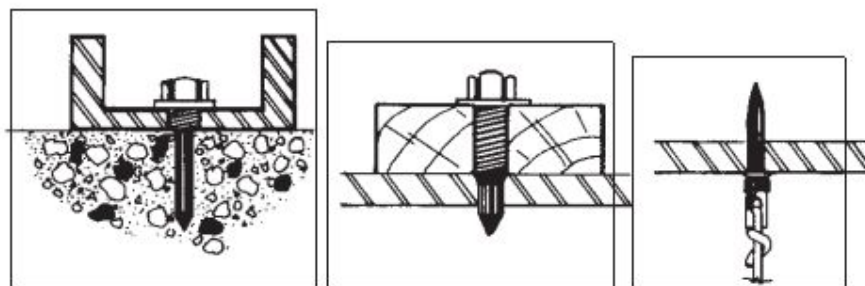
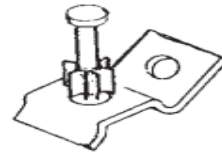
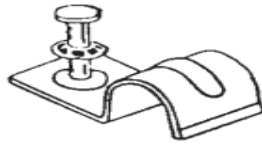


Fig. types of studs

- ✓ **Clip Assemblies:** - Fastening to the base material is done by a pin, but the pin is attached to a clip assembly configured to secure a uniquely shaped item (Figure 40-5). Clip assemblies are available, for instance, to hold conduit. One ceiling configuration comes with pre-tied 12-gauge wire.

Carpentry L II	September 2019	Page 21 of 36
Version I	Copy right: Federal TVET Agency	



✓ Cartridges

Manufacturers recommend certain cartridges for certain applications. Because recommendations cannot cover every possibility, testing may be required with unfamiliar base materials. Cartridges come in .22, .25, and .27-calibre sizes. Larger calibers hold more powder, which drives the fastener in further—or into harder base materials. In addition, all three calibers are available with different levels of powder charge. For some tools, there may be as many as six different powder charges available. Some manufacturers produce tools that use a long-case version of the .22-calibre cartridge. It is critical that operators understand cartridge selection and cartridge identification system. Shots may be packaged or loaded as single cartridges, strips of ten in a plastic holder, or a round disk holding ten cartridges. The tool model will determine the caliber and how the tool is to be loaded. Number identifications are printed on the outside of cartridge packages. Cartridge tips are color-dipped for identification. Some strip cartridges are held in a plastic strip the same color as the cartridge tips. The general rule is to start with the weakest cartridge and increase one cartridge color/load number at a time to reach the penetration required. Too strong a charge may cause shattering, ricochets, or blow-through. Too weak a cartridge will keep the fastener from seating itself properly.

✓ Gas Canister

Some explosive-actuated models are powered by a replaceable fuel cell. The cell contains a mixture of gases typically composed of butane, propylene, propane, dimethyl ether, butylenes, etc. Consult the manufacturer's Safety Data Sheet (SDS) for complete details about chemical composition. When the nose of the tool is depressed, a specific amount of gas is released into a combustion chamber and ignited by a spark when the trigger is pressed. This action causes the piston to drive the fastener to a set depth.

• Tool Power Controls

Some tools feature a "power control" device. This allows an operator to make a tool adjustment so that either all or only part of the available cartridge power is used. Power controls may ultimately let manufacturer's market only one cartridge in each caliber. The goal would be to handle every application that the caliber is capable of performing with one cartridge, power-controlled to the appropriate driving force needed.

Carpentry L II	September 2019	Page 22 of 36
Version I	Copy right: Federal TVET Agency	



Self-Check -4	Written Test
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Directions: Match column A with column B for all the questions listed below. Use the Answer sheet provided in the next page:

Column A

1. Use an explosive cartridge or gases discharge to fire a fastener in to hard materials
2. Hazard of EPT results when the tool is not held at the right angles to the base materials
3. The most explosive actuated tolls used in construction
4. Fasteners designed to attach one material to another

Column B

- A. Ricochet
- B. Studs
- C. Low velocity tools
- D. Explosive actuated tools
- E. Pins

Note: Satisfactory rating – 3 points

Unsatisfactory - below 3 and 4 points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Matching Questions

1. -----
2. -----
3. -----
4. -----



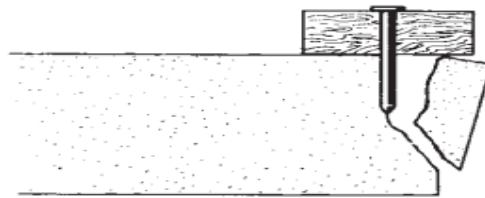
3.5 Carrying out EPT operation and fixing fastener

• **Fastening Steel**

Low-velocity explosive-actuated tools should not be used on hardened steels, tool steels, or spring steels. Where the grade of steel is unknown, test by trying to hammer the fastener in. If the pin is blunted, bent, or fails to enter at least 2 mm (1/16"), do not use a low-velocity explosive-actuated tool it's not up to the job. Don't try to fire a fastener any closer than 13mm (1/2") to the free edge of steel. Keep in mind that this applies only to steel. When fastening steel to concrete, you must consider the allowable margin for concrete as well: 63 mm (2 1/2"). When fastening two pieces of thin sheet steel to a base material, hold the sheets together. Gaps caused by bending may lead to ricochets. Special spall stops or protective shields are required for applications such as fastening sheet metal to masonry or sheet metal to structural steel. Consult the operating manual or the manufacturer to ensure that the right components are being used for the job.

✓ **Fastening Concrete and Masonry**

Concrete and masonry materials are not always uniform in consistency or hardness. As a result, they may spall, chip, or cause a ricochet when the fastener strikes a spot or layer harder than the rest. Use the spall guard recommended by the manufacturer. Once material is spalled or left with a ricochet hole, do not fire a second pin any closer than 50 mm (2") to the damaged area. The area may be weakened and spall further or causes a ricochet off its sloped edge. Ricochet off a Sloped Edge Pins tend to cause breaks near the edges of concrete and masonry. Don't drive pins closer than 63 mm (2 1/2") to a free edge



✓ **Misfires**

With misfired cartridges, follow the procedures stated in the operating manual for the tool you are using. Because of the wide variety of tools available, procedures for misfires may differ. When such information is not available, take the following steps.

- Continue to hold the tool against the base material for at least 30 seconds. This protects against a delayed discharge of the cartridge.
- Remove the cartridge from the tool. During removal, keep the tool pointed safely toward soft material such as wood. Never use any kind of prying device to extract the cartridge from the chamber. If the cartridge is wedged or stuck, tag the tool "DEFECTIVE and LOADED" and lock it in its storage container. Never try to dismantle a tool with a cartridge stuck or

Carpentry L II	September 2019	Page 25 of 36
Version I	Copy right: Federal TVET Agency	



wedged in it. Again, tag it “DEFECTIVE and LOADED,” lock it away, and call the manufacturer’s representative for help.

- Regulations require that a misfired cartridge be placed in a container of water.
- Keep the misfired cartridge separate from unused cartridges and return it to the manufacturer for disposal. Never throw misfired cartridges in the garbage.
- Be cautious. The problem may be a misfired cartridge, but the tool may also be defective. Check the tool for obvious damage, perform function tests, and use the tool only if it operates properly.

- **General Safeguards**

- Workers who pick up an explosive-actuated tool must immediately prove to themselves that the tool is not loaded. This action must become instinctive and be carried out before anything else is done with the tool. Even after watching someone else handle the tool before passing it on, make sure that it’s not loaded.
- Explosive-actuated tools should be used, handled, and stored properly.
- Never put your hand or fingers over the end of the muzzle for any reason, even when the tools are not loaded with fasteners.
- Tools must be inspected and function-tested before work starts. Proper training and the operator’s manual will describe how to carry out both of these requirements.
- Operators must be trained on the explosive actuated tools they are using and must wear all the required personal protective equipment.
- Firing explosive-actuated tools from ladders is not recommended. From a ladder, it can be difficult to press the tool muzzle against the base material with enough pressure to fire while maintaining three-point contact with the ladder. Consider using a platform ladder or scaffold. For tasks overhead or at heights, work from a scaffold or another approved work platform to ensure solid, balanced footing. As an alternative, use a manufacturer’s pole accessory if the reach is normal ceiling height (8–10 feet).

The pole secures the tool and permits firing by the operator standing below.

- Do not leave the tool unattended unless it’s locked in a box.
- Load the tool immediately before firing. Don’t walk around with the tool loaded.
- Do not use explosive-actuated tools in areas where there may be exposure to explosive vapors or gases.
- Fasteners should not be fired through pre-drilled holes for two reasons.

- 1) Unless the fastener hits the hole accurately, it will probably shatter the edge.
- 2) The fastener derives its holding power from compressing the material around it. A predrilled hole reduces this pressure and therefore the fastener’s holding power. (This is why studs and pins driven into steel should penetrate completely through the metal. Otherwise the compressed steel trying to regain its original position can loosen the fastener by pushing against the point. With the tip completely through the metal the same pressure only works to squeeze the pin tighter.)

Carpentry L II	September 2019	Page 26 of 36
Version I	Copy right: Federal TVET Agency	



- **Maintenance**

Tools in regular use should be cleaned daily. Tools used intermittently should be cleaned after firing. All parts of the tool exposed to detonation gases from the cartridge should be cleaned and lightly oiled according to the manufacturer's instructions. The cartridge magazine port, cartridge chamber, and piston sleeve should be wiped clean but never be oiled. The tool brush supplied is adequate for most cleaning tasks. Stubborn carbon should be loosened with a manufacturer's spray detergent oil. Tools being checked for immediate use should be wiped dry of oil. Failure to clean the tool as recommended can lead to corrosion, pitting, fouling, and failure to work properly. Ideally, the tool should be cleaned before being returned to storage.

Tools with a power control adjustment will accumulate additional powder residue from firing especially when the control is set to restrict the amount of cartridge strength being used. Semiautomatic tools may also accumulate powder residue. These tools need to be cleaned more often. Sluggish performance may indicate that a tool needs cleaning. Tool action will slow to the point where a competent operator can detect the difference. Most manufacturers recommend major maintenance, inspection, and cleaning every six months. This involves stripping, inspecting, and cleaning parts not covered in daily maintenance.

- **Storage**

Regulations require that both the tool and the cartridges be stored in a locked container with explosive loads of different strengths in separate containers. Cartridges should only be removed from the locked container when they are going to be used immediately.

- **Regulations**

- ✓ Any worker using an explosive-actuated tool must be instructed in its safe and proper use.
- ✓ Before using the tool, the operator must check to ensure that it is in good working order. This means inspection and function testing.
- ✓ Tools firing fasteners at a velocity of more than 90 metres/second must have a protective guard at least 75 mm in diameter, mounted at right angles to the barrel of the tool and centered on the muzzle end of the tool, if practical.
- ✓ The tool must require two separate actions before it will fire:

- 1) Pressure against the surface of the material
- 2) Action of the trigger.

- Explosive-actuated tools must be stored in a locked container when not in use or when left unattended.
 - The tool must not be loaded until ready for immediate use.
 - Whether loaded or unloaded, the tool must never be pointed at anyone.
 - Cartridges must be marked or labelled for easy identification. Cartridges of different strengths must be stored in separate containers.
 - Misfired cartridges must be placed in a container of water and be removed from the project.
- Lead Exposure There is the potential for overexposure to lead when using explosive actuated fastening tools in indoor applications with poor ventilation. Hands and skin may also become contaminated by lead. This could lead to ingestion if skin is not covered and hands are not washed.

Carpentry L II	September 2019	Page 27 of 36
Version I	Copy right: Federal TVET Agency	



- **Controlling Lead Exposure**

1. Consider alternative fastening methods such as gas-powered systems.
2. If you must use explosive-actuated tools, follow the Ministry of Labour's Guideline "Lead on Construction Projects". Some recommendations for the operator include:
 - The guideline recommends at least an N95 respirator. However, refer to the manufacturer's specifications to determine if the respirator can protect against lead.
 - Wear protective clothing such as gloves and coveralls.
 - Wash hands with soap and water before breaks, eating, drinking, or smoking, and do not chew gum.
 - Never take contaminated work clothes home.

If you suspect that you are suffering symptoms from lead exposure, see your family doctor and ask for a blood test to determine the presence of lead. Lead contamination in the human body can accumulate over time. It also takes the body time to expel this lead after exposure

Carpentry L II	September 2019	Page 28 of 36
Version I	Copy right: Federal TVET Agency	



Self-Check -5	Written Test
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Directions: Say True or False all the questions listed below. Use the Answer sheet provided in the next page:

1. Low velocity explosive actuated tools should not be used on hardened steel
2. Safety requirements for explosive power tools need special concern
3. Fastener should be fired through pre drilled

Note: Satisfactory rating – 3 and 4 points

Unsatisfactory - below 3 and 4 points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

1. -----
2. -----
3. -----



Operation Sheet 1	Techniques cross cut
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1.1. The techniques for cross cut are;

Steps 1- Select cross cut saw, meter, try square, marking tools

Steps2 – Use appropriate material safety material

Steps3 – Hold the stock to the vice

Steps 4 – Hold try square 90^0 to the edge of the stock

Steps 5 – Mark by using marking tools

Steps6 – Cut across the grain

Operation Sheet 2	Techniques rip cut
--------------------------	---------------------------

1.2. The techniques for rip cut are;

Steps 1- Select rip cut saw, meter, try square, marking tools

Steps2 – Use appropriate material safety material

Steps3 – Hold the stock to the vice

Steps 4 – Hold try square 90^0 to the end of the stock

Steps 5 – Mark by using marking tools

Steps6 – Cut along the grain direction

Step 7 - Apply proper housekeeping measures

LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary drawing, tools and materials you are required to perform the following tasks within 3-4 hours.

Task 1: select and use the right tools and material for the project



Task 2: secure/ hold the stock in to vise

Task 3: measure to the right dimension

Task 4: cut the stock to the right dimension

Task 5: mark the groove area on the stock

Task 6: groove the stock by using the appropriate tools

Task 7: apply proper housekeeping measures

Carpentry L II	September 2019	Page 32 of 36
Version I	Copy right: Federal TVET Agency	



Table of Answer keys for the self checks provided on each information sheets

UNIT OF COMPETENCY: use carpentry hand and power tools									
LO: 3 LG: 24 Use tools.									
Self check: 1		Self check:2		Self check:3		Self check:4		Self check: 5	
Multiple choice		Matching		True or False		matching		True or false	
1	A	1	A	1	True	1	D	1	True
2	C	2	D	2	False	2	A	2	True
3	B	3	E	3	False	3	C	3	True
4	C	4	B	4	True	4	E	4	
5		5		5	True	5		5	



List of Reference Materials

References

- USE CARPENTRY TOOLS AND EQUIPMENT CERTIFICATE II IN BUILDING AND CONSTRUCTION CERTIFICATE II IN BUILDING AND CONSTRUCTION (PATHWAY – TRADES) CPCCCA2002B
- Construction Health and Safety Manual
- [MONITOR%20WORK%20OPERATIONS.pdf%20_%20Competence%20\(Human%20Resources\)%20_%20Goal.html](#)
- Best practice guide to improving waste management on construction sites
- Interpreting and Applying Equipment Specifications I
Speaker/Author: Suzanne
- Waste management at the construction site By Joseph Laquatra and Mark Pierce
- Manage workplace operations Trainee Manual William Angliss Institute of TAFE

Carpentry L II	September 2019	Page 34 of 36
Version I	Copy right: Federal TVET Agency	



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