Mineral Resources Infrastructure Work

NTQF Level-1

Learning Guide # 36

Unit of Competence: - Use Hand and Power Tools

Module Title: Using Hand and Power Tools

LG Code: **MIN MRI1 M10 LO3-LG-36**

TTLM Code: **MIN MRI1 TTLM 0819v1**

LO 3: Select and use power tools

Instruction Sheet	Learning Guide # 36

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

- Standard work practice
- Identifying energy sources for power tools
- Selecting power tools and equipment
- Checking tools for serviceability and safety
- Reporting faults
- Checking power leads/hoses visually for serviceability
- Clearing route for leads /hoses
- Fixing or clamping materials in position for power tool
- Using power tools safely and effectively
- Locating power tools safely

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 –

- Know Standard work practice
- Identify energy sources for power tools
- Select power tools and equipment
- Check tools for serviceability and safety
- Report faults
- Check power leads/hoses visually for serviceability
- Clear route for leads /hoses
- Fix or clamp materials in position for power tool
- Use power tools safely and effectively
- Locate power tools safely

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 8.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish from “Self-check 1 up to Self-check 10
5. Ask your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check).

6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Information Sheet 2
7. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 and Operation Sheet 2 in page 40 and 41 respectively
8. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Standard work practice

1.1 Definition

- Standardized work practice is a tool for maintaining productivity, quality, and safety, at high levels.
- Standardized work practice is defined as work in which the sequence of job elements has been efficiently organized, and is repeatedly followed by workers.

1.2 Importance of implementing Standardized Work practice in a work site

- Provides a basis for employee training
- Establishes process stability
- Reveals clear stop and start points for each process
- Assists audit and problem solving
- Creates baseline for kaizen
- Enables effective employee involvement
- Maintains organizational knowledge

1.3 Elements of Standardized Work Source:

A. Takt Time and Cycle Time

- Takt Time = Daily operating time / Required quantity per day
- Cycle Time = Actual time for process
- Goal is to synchronize takt time and cycle time

B. Work Sequence

- The order in which the work is done in a given process
- Can be a powerful tool to define safety and ergonomic issues

C. In-Process Stock

- Minimum number of unfinished work pieces required for the operator to complete the process

1.4. Standard safety work or operating procedures

Many hazards can be overcome or avoided by the use of Standard Work or Operating Procedures which are sometimes referred to as Standard Operating Procedures. These provide instructions on how to carry out tasks safely.

Your supervisor will be able to provide you with a list of Standard Work or Operating Procedures and you should read through them. They can be presented in different ways such as:

- Written Tasks
- Check list
- Flow charts
- Drawings and diagrams
- Information sheets
- Manufacturer's instructions

1.5 Some Common Safe Work Practices

- Always follow manufacturer recommendations regarding maintenance and safe use
  - Guards in place and working
  - All power cords in safe working condition
  - Timely replacement of blades, bits, etc.
  - Never bypass a safety feature
- Never modify a tool beyond its intended use.
- Use all required personal protective equipment

Self-Check -1	Written Test

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

1. Define what mean standardized work practice?3point
2. Mention at least four implementing Standardized Work practice in a work site? 3point
3. List the elements of standardized work source? 4point

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Identify energy sources for power tools

2.1 Definition of power tools

Power tools is a tool that is actuated by an additional power sources and mechanism other than the manual labor used with hand tools.

2.2 Power sources of power tools

General we have three energy sources of power tools.

Such as: electric, pneumatic, hydraulic power tools, Petrol or Diesel Generators and batteries.

A. Electric power tools

These materials can be used electric as a power sources. The following are some of examples of electric power tool their functions.

Table-1 Electric Power Tool Their Functions

No	Name	Image	Function of power tools
1	**Crushing Grinders**		▪ used for grinding (abrasive cutting) and polishing
2	Planers		▪ Is a tool for shaping wood using moto rized power to force the cutting blade over the wood surface of larger tasks
3	Drills		▪ used for making round holes or driving fasteners

4	circular saws		▪ Used to cut different materials using a rotary motion spinning around an arbor.
5	Gold Detector Machine		▪ an electronic instrument which detects the presence of metal nearby and are useful for finding metal inclusions hidden within objects, or metal objects buried underground

B. Pneumatic power tools

Table-2 Pneumatic Power Tool Their Functions

No	Name	Image	Function of power tools
1	Pneumatic wrenches		▪ used to absorb the torque and allows the tool operator to use it with very little effort
2	Rotary hammers/drills		▪ can perform heavy-duty tasks such as drilling and chiseling hard materials
3	Impact hammers		▪ Used to break up rock, pavement, and concrete.

4	Air Compressor		▪ An equipment that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air (i.e., compressed air)
5	Pneumatic drills		▪ used to break up rock and pavement
6	Sander		▪ used to smooth surfaces by abrasion with sandpaper
7	Screwdrivers or impact drivers		▪ Used by mechanics to loosen larger screws (bolts) and nuts that is corrosively "frozen" or over-torque.
8	Pneumatic grinder		▪ They can be used to help quickly remove excess materials from a work piece, smooth metal joints after welding or remove paint and primer

C. Hydraulic power tools

Table-3 Hydraulic Power Tool Their Functions

No	Name	Image	Function of power tools
1	Hydraulic press		▪ It uses the hydraulic equivalent of a mechanical lever to generate a compressive force

2	Hydraulic jack		▪ Is a device that uses force to left heavy loads

D. Petrol or Diesel Generators

Portable generators are a common source of electrical power on small work sites. When using tools connected to petrol or diesel generators

Figure 1-Portable Generator

E. Batteries

Cordless tools are powered by batteries. These batteries must be recharged on a regular basis.

Table- 4 Power Tools operated by Batteries and their Functions

No	Name	Image	Function of power tools
1	Gold Detector Machine		▪ an electronic instrument which detects the presence of metal nearby and are useful for finding metal inclusions hidden within objects, or metal objects buried underground
2	Battery-powered Cordless Drill		Drill holes in material.

Self-Check -2	Written Test

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

1. Write the definition of Power tools? 3point
2. List at least three electric power tools with their functions? 3point
3. Mention at least four pneumatic power tools with their functions? 4 point

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Select Power Tools And Equipment

3.1 Tool Selection

- The versatility and efficiency of power-assisted tools makes them the preferred choice for many work applications. The speed at which power tools operate gives them an advantage over hand tools. Correct selection, use and inspection of power tools is an important part of your work on site.
  - The tool should perform the job it is intended for.
  - The tool must be usable by the employee and not cause discomfort or physical pain.
  - Handle shape/form:
    - It should minimize hand and upper body stress.
    - It should be ergonomically well-designed to reduce hand fatigue.
  - Quality of the tool
    - sharpness
    - strength
    - reliability
  - Vibration control
  - Vibration may cause hand-arm syndromes; such as hand-arm vibration syndrome (HAVS), aka Reynaud's syndrome.
  - Provide workers with pads or gloves.
  - Use administrative controls such as work rotation or frequent breaks.
  - If possible, use foot controls and alternate hand and foot use.
  - Work stations
    - Each work station should be adjustable so that it may be adjusted to different worker requirements.
    - It should facilitate full range of motion.
    - If possible, provide mechanical means of handling materials.
  - Work methods evaluation
    - How much force is needed to hold and/or use the tool?
    - What is the direction of the force?
    - What is the weight of the materials?
    - How many repetitions must the worker perform?

- What is the employee's postural position?

3.2 Select Proper Power Switches

Hand-held power tools must be equipped with one of the following:

A. Constant pressure switch

Shuts off power upon release

Examples: circular saw, chain saw, grinder, hand-held power drill

Figure 3.1-Constant pressure switch

B. On-Off Switch

Examples: routers, planers, laminate trimmers, shears

Figure 3.2-On-Off switch

Self-Check -3	Written Test

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

1. Write the advantage of tool selection? 3point
2. Mention at least three important of work methods evaluation? 3point
3. What is the difference between constant pressure switch and On-Off Switch? 4 point

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-4	Check tools for serviceability and safety

4.1 Power Tools - Precautions

- Disconnect tools when not in use, before servicing and cleaning, and when changing accessories Power Tools – Precautions
- Secure work with clamps or a vise, freeing both hands to operate the tool
- Keep tools sharp and clean
- Consider what you wear – loose clothing and jewelry can get caught in moving parts
- Remove damaged electric tools & tag them: "Do Not Use

4.2 Precautions of Electric power tools

- Don't carry portable tools by the cord
- Don't use electric cords to hoist or lower tools
- Don't yank cord or hose to disconnect it
- Keep cords and hoses away from heat, oil, and sharp edges

Figure 4.1-improper use of power tool

4.3 Precautions of Pneumatic and Hydraulic Power Tools

- Ensure the tool is well lubricated as per the manufacturer's recommendations
- Never alter, repair or modify a pneumatic or Hydraulic power tool
- Check the tool, the hoses and the compressor/hydraulic pumps prior to use
- Use safety clips or other safety devices on compressed air hoses
- Never use any other gasses in the place of compressed air
- Ensure that any hydraulic pumps are filled with the correct fluids and has sufficient fluid levels
- Ensure that over pressurization warning devices are functional
- Always isolate air compressors and hydraulic pumps, ensuring that the pressure has been released or controlled before making adjustments or tool changes.

4.4 Precautions of Petrol or Diesel Generators

Portable generators are a common source of electrical power on small work sites. When using tools connected to petrol or diesel generators, observe the following safety precautions

- Place the generator on flat dry ground.
- Never operate an internal combustion engine in a confined space.
- Check that there is at least one meter of clear space on all sides.
- Dry your hands before touching the generator.
- Switch the generator off and allow it to cool down before refueling.
- Plug the portable power tool directly into the generator.
- Do not use double adapters and spider boxes

4.5 Precautions of Using Batteries

Cordless tools are powered by batteries. These batteries must be recharged on a regular basis.

➢ Observe the following precautions when using cordless power tools.

- Recharge a cordless tool and its battery with the specified charging unit.
- Charging should be done in a safe dry environment.
- Unless the batteries are removed, the tool can function at any time when the switch is turned on.
- Remove batteries or lock the switch before changing accessories and adjusting or cleaning tools.
- Avoid exposing the battery pack to moisture.
- Do not touch the terminals with any conductive material or store the battery pack in a container with metal objects such as wire, nails or coins.

4.4 Common Power Tool Hazards

- Workers using power tools may be exposed to a number of potentially serious hazards:
  - ❖ Hit by flying material from the work piece
  - ❖ Hit by flying part of a broken tool
  - ❖ Explosion or fire resulting from sparks from a tool igniting combustible materials
  - ❖ Electric shock from a broken tool, frayed or defective power cord, or improper grounding
  - ❖ Exposure to harmful dusts, fumes, mists, vapors, and gases
- Hazards are usually caused by misuse, improper maintenance and complacence.

- With power tools, carelessness and mistakes can lead to serious and often permanent injuries and even death

Using saw while wearing a wedding ring

Grinding wheel exploded striking worker in face

Grinding wheel exploded striking worker in face

Hand of worker shocked by drill he was holding

Figure 4.2 -Common Hazards Lead to Serious Injuries

4.5 Hazard Prevention - 5 Simple Rules

- All hazards involved in the use of power tools can be prevented by following five basic safety rules:
    1. Always inspect each tool as well as power cords and attachments for damage before use
    2. Keep all tools in good condition with regular maintenance.
    3. Always use the right tool for the job
    4. Only operate power tools according to the manufacturer's instructions -- That means Read the Instruction Manual!
    5. Always use the appropriate protective equipment!

Self-Check -4	Written Test

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

1. List the 5 simple rules of hazards mitigation? 5point
2. Mention at least four common power tool hazards?2.5 point
3. List at least three power tools – precautions? 2.5 point

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-5	Report faults

5.1 Introduction

In this session we explore possible problems and malfunctions that might be experienced during the use of power tools and explore how this may be remedied. We will further discuss the importance of reporting problems that with tools and equipment as well as the correct procedure to follow to report a problem or malfunction.

5.2 Problems and malfunctions of hand tools

All tools require regular maintenance to work properly. Clean all tools after each use with water and treat with a penetrating oil to prevent rust. Tools that require a sharp edge must be sharpened regularly as sharp tools are safer and more efficient to use.

- Various sharpening methods are used depending upon the tool.
- It is important to become familiar with the methods relevant to the tools you use.
- Check tools regularly for loose nuts and screws and tighten as needed.
- Sand rough handles and repair cracks as soon as they are noticed to prevent injury.
- Store tools in a dry area out of the elements.
- Hanging tools against a wall is an ideal way to organize the store tools in a shed.

5.2 Reporting problems and defective power tools

Broken or damaged tools can cause injury or accidents in the workplace. The quicker problems are reported, the quicker the tool can be fixed or replaced and the less the risk or injury.

Broken or incomplete tools must not be used but placed in a special place for it to repaired or adapted. This will prevent injury and will enhance the life of the tool. Persons with proper training and skill should repair the power tools. Preventative maintenance like fastening loose nuts or shafts will greatly reduce the need for large-scale repairs.

5.3 Reporting problems and malfunctioning of power tools

- Every work site has its own set of procedures and systems to deal with the organizing, issuing and controlling tool stock.
- It is important that you find out who is responsible for different aspect regarding tools and equipment on the job where you work.
- Also you should know who you have to report problems or defects to.
- Do not attempt to fix, maintain or use a tool if you have not been trained to do so.

- It is essential that problems and malfunctions be immediately reported to the correct person to prevent risk of injury through the use of the tools.
- It is important to respect the roles of the people placed in charge of organizing and maintaining tools\because this also protects your safety.
- Supervisors need to be trained to check that laborers use tools in a proper way. Even when using a tool correctly a certain way of handling the tool will cause premature wear or damage to it.

Self-Check -5	Written Test

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

1. Write the advantage of reporting faults? 2.5 point
2. Who is responsible to report problems and defective power tools? 2.5 point

Note: **Satisfactory rating - 2.5 point points** **Unsatisfactory - below 2.5 point points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-6	Check power leads/hoses visually for serviceability

6.1 Checking Main Power Leads/Cables

- An electrical power cable or cord connects the tool to the mains power supply. Before connecting any electrical tool to a power source, inspect the:
  - Casing and switch
  - Lead and plug
  - inspection tags are up-to-date
  - Ventilation holes are clean
  - Spider boxes

Figure 6.1- Inspecting of Leads

- Electrical tools can generate sparks and should not be operated near flammable liquids/gases or explosive environments.
- Make sure that the route for leads and hoses is clear of all hazards and connections are away from water and other conductive materials

  Do not:
  - Use equipment with damaged leads or expired inspection tags
  - Use double adaptors
  - Carry or suspend tools by their leads

Figure 6.2- Inspecting of Tag

6.2 Checking Hydraulic or Pneumatic Hoses and Fittings

Hydraulic or Pneumatic Hoses

Hydraulic hoses are subject to extreme conditions such as, pressure differentials during operation and exposure to weather, sun, chemicals, high temperature operating conditions or mishandling during operation or storage.

Figure 6.3- Hydraulic

Inspecting Hoses

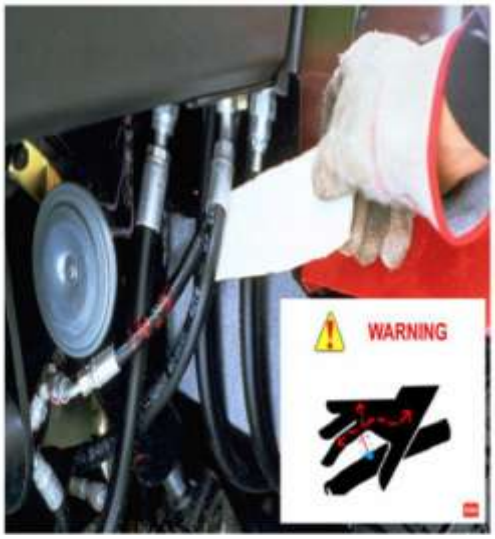

Figure 6.4- Inspecting

- Inspect hoses for signs of deterioration or damage.
- Check hoses for leakage and replace when leaks are found.
- Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under pressure.
- Use paper or cardboard, not hands, to search for leaks. Hydraulic or Pneumatic fluid escaping under pressure can have sufficient force to penetrate the skin and do serious damage.
- If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury or gangrene may result
- When replacing a hydraulic hose, be sure that the hose is straight (not twisted) before tightening the fittings.

6.3 General Instructions for Visual Inspection of Hoses

1. Look for cuts, gouges, or worn spots in the hose cover that expose textile or wire reinforcement.
2. Inspect for soft spots, bulges or blisters in cover, sections of mashed flat hose or kinked areas.
3. Carefully examine a length of the hose (18" in length adjacent to where the coupling is attached) for any damage such as kinks, soft spots, cover cracks, or permanent deformation of the hose from its original form.
4. Check couplings for any slippage which is evidenced by misalignment of the coupling or scored/exposed areas on the hose cover next to the coupling which indicates movement of the coupling.

Check couplings for worn threads, loose clamps or bands, worn gaskets, worn or broken handles, cam-arms and pins

Self-Check -6	Written Test

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

Say true if the statements is correct and say false if the statement is incorrect

1. An electrical power cable or cord connects the tool to the mains power supply. 2 point
2. Electrical tools can generate sparks and should be operated near flammable liquids/gases or explosive environments. 2 point
3. Make sure that the route for leads and hoses is clear of all hazards and connections are away from water and other conductive materials. 2 point
4. Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under pressure. 2 point
5. Use paper or cardboard, not hands, to search for leaks. Hydraulic or Pneumatic fluid escaping under pressure can have sufficient force to penetrate the skin and do serious damage. 2 point

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-7	Clear route for leads /hoses

7.1 Introduction

If you are working in a large company that has a lot of hydraulic machinery and a lot of highly trained hydraulic individuals, you know how important it is to have clean hydraulic oil. One of the sources of hydraulic contamination is from ingression. Ingression happens anywhere where it's added to the system through just plain dirt dropping in your reservoir, from steel filings or from anywhere outside the system. You don't want to be additive to that if you're doing hydraulic hose assembly.

7.2 Cleaning Hoses

1. Hoses should be thoroughly flushed out and drained before testing and after service or prolonged storage
2. Flush with fresh water, detergent or suitable solvent at ambient temperatures
3. Cleaning fluids should be flushed out with clean water to avoid chemical reactions with service products

- This process is typically accomplished by flushing the interior of the hose with water or a cleaning solution. Cleaning procedures may differ by industry
  - All staff must wear personnel protective gear, i.e. eye protection & hard hat, gloves, protective clothing, etc.
  - Cleaning solutions should be able to dissolve or remove the residue material in the hose assembly and must be compatible with the hose tube & couplings.
  - All material flushed along with the cleaning solution must be processed in accordance with EPA requirements.
  - Extreme care must be taken when inserting cleaning devices such as brushes, steam wands etc.
  - To insure no cleaning chemical residue is left in the hose assembly, the hose can be hung vertical for a brief time to drain.
  - Warm air (120°F) can be circulated through the hose for drying.
  - If hose is cleaned in a dip tank, do not exceed the temperature limits of the hose.
  - Steam cleaning is not a preferred method of cleaning. Only use steam when it is recommended for the specific type of hose.
  - NEVER use superheated steam

7.3 Safety Warning

Before conducting any pressure tests on hose, provisions must be taken to ensure the safety of personnel performing the test and to prevent any possible damage to property. Only trained personnel using proper tools and procedures should conduct any pressure test. Hydro test the hose after it has been completely inspected as described.

1. Air or other compressed gases should not be used for pressure testing.
2. All air should be removed from the hose prior to testing by bleeding it through an outlet valve attached to one end of the hose.
3. The outlet ends of the hose should be placed so that an ejected fitting will be restrained by a wall, sand bags, etc.
4. Provision must be made to protect personnel from the forces of the pressure media if a failure occurs.
5. Testing personnel must never stand over, in front of, or in back of the ends of a hose being pressure tested.
6. Inspect the hose tube for hardness, color change, cracks, blisters, erosion, etc

Self-Check -7	Written Test

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

Say true if the statements is correct and say false if the statement is incorrect

1. After you create a hose assembly, you need to clean the hose. 2 point
2. One of the sources of hydraulic contamination is not from ingression. 2 point
3. Hoses should be thoroughly flushed out and drained before testing and after service. 2 point
4. Cleaning fluids should be flushed out with clean water to avoid chemical reactions with service products. 2 point
5. To insure no cleaning chemical residue is left in the hose assembly, the hose can be hung vertical for a brief time to drain. 2 point

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-8	Fix or clamp materials in position for power tool

8.1 Introduction of Clamps

Clamps are another useful holding tool, like other tools, require some maintenance; lubricate periodically, and keep threads clean and free of rust.

Usually larger tubes and pipes are cut with power cutters. In any case, it is important not to force too much pressure on the cutting wheel as it may shatter and cause dangerous fragments to fly off. When setting up to cut, make sure to check the cutting wheel for nicks and make sure to keep the cutter perpendicular to the tube or pipe to ensure accurate tracking.

For larger clamping jobs there are **bar clamps** and **pipe clamps.** Usually larger tubes and pipes are cut with power cutters

A. **Pipe clamps:-**a clamp for Holding pipe that is to be cut or threaded

FIG 8.1.Pipe clamps

B. **Bar clamps:-** a frame consisting of a long bar with two adjustable clamping jaws that is used usually in woodwork or cabinetmaking for holding large work

Figure 8.2. Bar Clamp

Self-Check -8	Written Test

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

Say true if the statements is correct and say false if the statement is incorrect

1. Usually larger tubes and pipes are cut with power cutters. 2.5 point
2. Bar clamps is a clamp for holding pipe that is to be cut or threaded. 2.5 point

Note: **Satisfactory rating – 2.5 points** **Unsatisfactory - below 2.5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-9	Use power tools safely and effectively

9.1 Safe Use of Power Tools

All power tools can be dangerous if both general and tool specific safety instructions are not followed carefully. General safety instructions apply to all electric (corded and cordless), pneumatic & hydraulic power tools.

9.2 Safe Use All Power Tools

- Assess the risks before using tools.
- Ensure you are properly trained and authorized to safely use the power tool. Always read and understand the tool's operator's manual, tool markings and the instructions packaged with the accessory before starting any work.
- Ensure you have the correct PPE for the task, some tools require different PPE to others.
- If the power tool has guarding or other safety devices they shall be fitted as per the manufacturers specifications
- Inspect the power tool for damage and or wear before use.
- Horseplay with any tool is strictly prohibited
- Do not operate power tools in explosive atmospheres, near flammable liquids, gases, or dust.
- Wait for the tool to stop spinning before placing it on the ground or bench
- Always switch off the tool and remove the plug before making adjustments
- Remove adjusting keys and spanners before operating
- Never modify or alter a power tool from its original manufacturers design.
- Never attempt to repair a faulty power tool unless authorized to do so
- Never use a tool that is prohibited from site (check the prohibited items register).
- Take all damage power tools out of service by attaching a warning tag
- If in doubt stop the task and seek further advice before recommencing.
- Explosive Power Tools are prohibited

9.3 Pneumatic & Hydraulic Power Tools

- Ensure the tool is well lubricated as per the manufacturer's recommendations
- Never alter, repair or modify a pneumatic or Hydraulic power tool
- Check the tool, the hoses and the compressor/hydraulic pumps prior to use
- Use safety clips or other safety devices on compressed air hoses
- Never use any other gasses in the place of compressed air

- Ensure that any hydraulic pumps are filled with the correct fluids and has sufficient fluid levels
- Ensure that over pressurization warning devices are functional
- Always isolate air compressors and hydraulic pumps, ensuring that the pressure has been
- Released or controlled before making adjustments or tool changes.

9.4 Electric Power Tools (corded and cordless)

- Wired electric and cordless power tools shall be tested and tagged and only used on a protected circuit.
- The use of extension leads will be used in accordance with the requirements set out in the electrical Safety Manual
- Do not use AC tools on a DC power supply (vice-versa)
- Ensure the correct current rated circuit is used (never modify a 15amp plug to fit into a 10amp socket)
- Do not use power tools in the rain or wet environments, approval from supervisor required for some tools such as cordless power tools
- Do not carry a power tool by its power lead
- Store cordless battery packs away from other metal objects like paper clips, coins, keys, nails, screws, or other small metal objects.
- Never overcharge battery packs – follow manufacturer's instructions
- Never disassemble a power tool or battery pack unless authorized to do so

Self-Check -9	Written Test

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

Say true if the statements is correct and say false if the statement is incorrect

1. Use AC tools on a DC power supply (vice-versa) 2 point
2. Do not carry a power tool by its power lead. 2 point
3. Use safety clips or other safety devices on compressed air hoses. 2 point
4. Horseplay with any tool is prohibited in work site area. 2 point
5. Modify or alter a power tool from its original manufacturers design. 2 point

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-10	Locate power tools safely

10.1 Definition of Location

Location means arranging necessary items so that they are easy to use and labelling them so that anyone can find them and put them away. The key word in this definition is “anyone”. No matter how well you arrange items, location can have little impact if many of the items are unnecessary and not sorted.

10.2 Benefits of Location

Location is important because it eliminates many kinds of waste from operations in a workplace. These include searching time waste, waste due to difficulty in using items, and waste due to difficulty in returning items. In general, the following problems and wastes are avoided when set in order is well implemented.

1. Motion wastes
2. Searching time wastes
3. The waste of human energy
4. The waste of excess inventory
5. The waste of defective products
6. The waste of unsafe conditions

There are some principles for deciding best locations for tools and equipments. Jigs, tools and dies differ from materials, equipments, machinery and parts in that they must be put back after each use. Some of the principles for jigs, tools and dies also apply to parts, equipments, and machinery. These are:

- Locate items in the workplace according to their frequency of use. Place frequently used items near the place of use. Store infrequently used items away from the place of use.
- Store items together if they are used together, and store them in sequence in which they are used.
- Device a “just let go” arrangement for tools. This approach involves suspending tools from a retractable cord just within reach so that they will automatically go back in to their correct storage position when released.
- Make storage places larger than the items stored there so that they are physically easy to remove and put back
- Eliminate the variety of jigs, tools and dies needed by creating a few jigs, tools and dies that serve multiple functions.
- Store tools according to function or product. Function-based storage means storing tools together when they have similar functions. This works best for job-shop production. Product-based storage means storing tools together when they are used on the same product. This works best for repetitive production

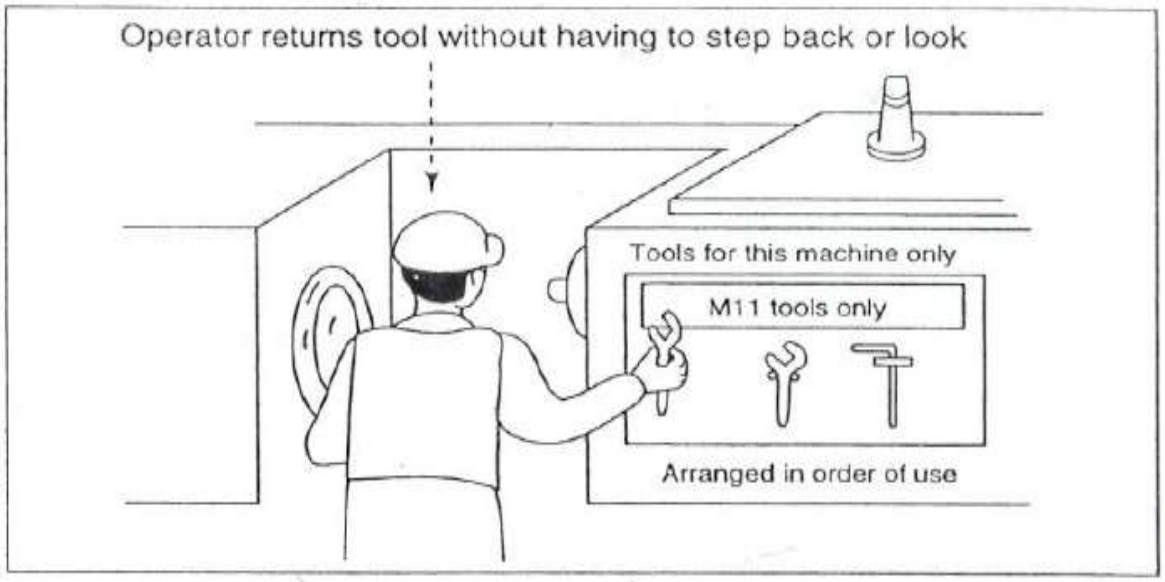

Figure 10.1 Tools kept in their proper location

10.3 Evaluating current locations and deciding best locations

Putting tools in the right position is a tool that can be used to evaluate current locations of parts, jigs, tools, dies, equipment, and machinery, and to decide best locations. Putting tools in the right position involves creating two maps ‘before map’ and ‘after map’. The ‘before map’ shows the layout of the workplace before implementing set in order. The ‘after map’ shows the workplace after implementing location.

Self-Check -10	Written Test

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

1. Define what mean location in power tool? 2 point
2. Mention at least five problems and wastes which are avoided when set in order is well implemented. 2 point
3. List at least four principles for jigs, tools and dies also apply to parts, equipments, and machinery. 2 point

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Use power tools safely and effectively

Steps of grinding process

Step 1-Select grinding wheel

Step 2-Clamping or fix

Step 3- Put the work piece on the surface plate table

Step 4-Swich “NO” the magnetic clamp

Step 5-Grind the work piece according to the drawing specification

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1 . Mention the Steps of grinding process?

List of Reference Materials

1. Accident Prevention Manual for Business & Industry
2. Hand and portable power tool safety guidelines
3. Occupational Safety and Health Administration John L. Henshaw, Assistant Secretary
4. Use hand and power tools **www.pertrain.com.au** Work Health and Safety Act, 2012
5. Work Health and Safety Regulations, 2012