

BASIC TEXTILE OPERATION

NTQF Level - I

Learning Guide # 20

**Unit of Competence: Use Power Tools for Hand
Held Operations**

**Module Title: Using Power Tools for Hand H
Operations**

LG Code: IND BTO1 M06 LO1-LG-20

TTLM Code: IND BTO1 TTLM 0919v1

LO 1: Use Power Tools



Instruction Sheet	Learning Guide # 20
--------------------------	----------------------------

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

- Selecting power tools
- Using power tools
- Adhering safety requirements
- Identifying common faults and/or defects in power tools
- Undertaking maintenance operational tools
- Storing power tools

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:

- Select power tools to appropriate task
- Use power tools for determined sequence of operation
- Adhere safety requirements
- Identify and mark unsafe/ faulty tools for repair
- Under take operational maintenance of tools
- Store power tools safely and appropriately



Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” in each information sheets.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You may get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets and LAP Tests if any”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
7. After you accomplish Operation sheets and LAP Tests, ensure you have a formative assessment and get a satisfactory result;
8. Then proceed to the next information sheet



Information Sheet-1

Selecting Power Tools

Power tools may include:

- Electric or pneumatic /hydraulic drills
- Grinders and jigsaws
- Nibblers and cutting saws
- Sanders and planers
- Routers and pedestal drills and pedestal grinders

Power tools are some of the most time-saving devices ever created. Through the use of compressed air, electricity, or combustion, they allow those using them to complete jobs that others using traditional tools either could not accomplish or would take significantly longer to do. Power tools can be divided into numerous categories including portability, power source, and purpose. Power tools usually come in one of two categories – stationary or portable. Stationary power tools are either large machines that are not easily moved or machines that must be tightly fastened to a stationary object in order to properly function. Portable power tools can be easily carried from one location to another, and are usually light enough to be used while being held in a person's hands. Stationary models usually have the advantages of precision, power, and smoothness; portable versions of versatility and travel.

Another way to consider power tools is by the energy they use to function. Power tools usually run on one of three types of power: compressed air, electricity, or combustion. When compressed air is used, air is pushed through the device in order to move various mechanical parts. The tool's air compressor is usually powered by an electric motor or a combustion engine. Tools powered by electricity most often use some form of electric motor. These tools either need to be plugged in to an electrical outlet or are battery powered. Finally, a few tools are powered by combustion. The combustion can take place either through the use of small explosive charges known as cartridges or in combustion engines.

Power tools can also be categorized by their purpose. The different types of power tools include the following:

1.1. Chain saw



Fig: 1.1. Chain saw

Chainsaws are the quintessential power tool. They are used to cut trees and trim branches, with specialized versions also available for cutting stone and concrete. These portable devices use a small engine to pull a bladed chain along a slotted guide bar. Modern chainsaws are powered by either an internal combustion engine or by an electric motor.

1.2. Drill



Fig: 1.2. Drill



The power tool version of this tool uses a motor to turn a bit. This results in the fast cutting of circular holes. Types include the stationary drill press and the portable cordless drill. Handheld drills can often be fitted with adapters so that they can drive screws, torque bolts, and even function as sanders.

1.3. Joiner



Fig: 1.3. Joiner

Joiners are specialized woodworking tools that use a saw blade to cut a thin slot into a piece of wood. A similar slot is cut into another piece, and the two are joined by placing a single piece of glue-covered wood into the slot and pushing the pieces together.

1.4. Jointer



Fig: 1.4. Jointer



This tool uses specialized blades to cut the surface off a piece of wood, making it flat.

1.5. Lathes



Fig: 1.5. Lathes

Lathes hold and spin materials so that they can be worked and shaped. Powered lathes allow the crafter to focus on working the material instead of having to constantly turn the spindle.

1.6. Nail guns



Fig: 1.6. Nail guns

These devices shoot out nails, propelling them into wood and other materials. They work much more quickly than the traditional hammering method.

1.7. Pneumatic Torque Wrench



Fig: 1.7. Torque wrench

This wrench uses compressed air to quickly and powerfully turn nuts, bolts, and other objects.

1.8. Sanders



Fig: 1.8. Sanders

Sanders smooth a surface by moving another rough surface over the top of it. They are one of the most varied types of power tools, and include belt sanders, disk sanders, drum sanders, and mouse sanders.

1.9. Saw

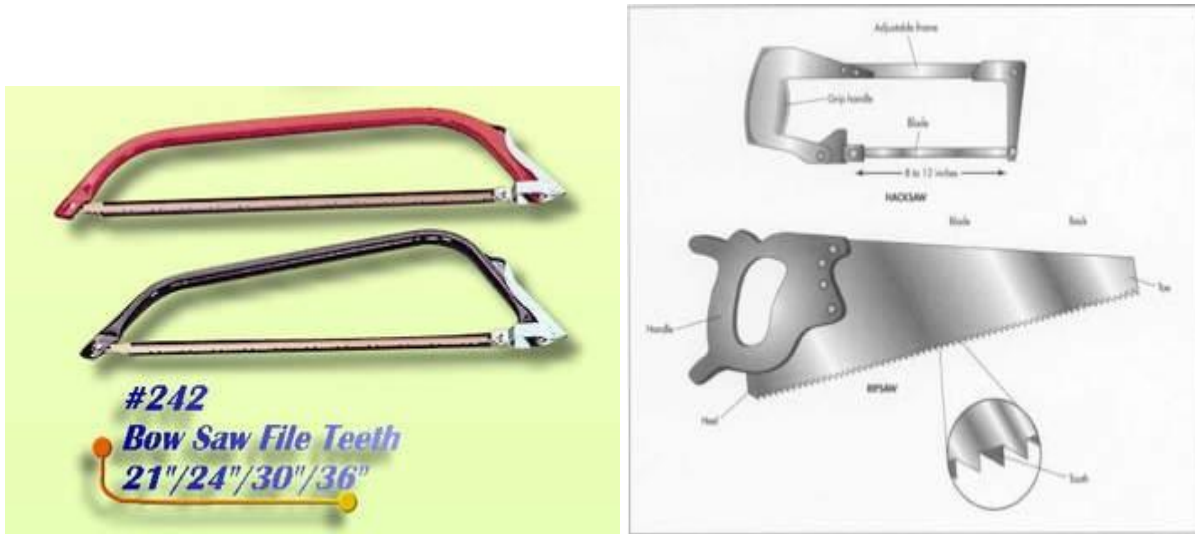


Fig: 1.9.saw

A saw is a type of cutting tool. Powered saws move a blade or band extremely fast, resulting in significant cutting power. Band, radial arm, and table are all different types of saws.



Self-Check -1

Written Test

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

1. List and explain some power tools?(**5 marks**)
2. What is the categorization and types of power tools? (**4 marks**)



Note: Satisfactory rating - 6 points

Unsatisfactory - below 6 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____



Information Sheet-2

Using power tools

Use and determine power tools

Power tools used for lamping/securing are: (multi grips, vice, jigs and fixtures, clamps)

Power tools used for Alignment and adjustment

Power tools used for Finnish and size or shape, sander, lathe



Self-Check -2	Written Test
----------------------	---------------------

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

1. What is the purpose of power tools?(**5 marks**)



Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



Information Sheet-3

Adhering Safety Requirements

3.1. Adhere all safety requirements before, during and after use

Safety precautions to remember include the following:

- These tools shall not be used in an explosive or flammable atmosphere;
- Before using the tool, the worker shall inspect it to determine that it is clean, all moving parts operate freely, and the barrel is free from obstructions;
- Employees shall not modify tools;
- The tool shall never be pointed at anybody;
- The tool shall not be loaded unless it is to be used immediately. A loaded tool shall not be left unattended, especially where it could be available to unauthorized persons;
- Hands shall be kept clear of the barrel end;
- To prevent the tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position and another to pull the trigger;
- The tools shall not be able to operate until they are pressed against the work surface with a force of at least five pounds greater than the total weight of the tool;
- If a powder-actuated tool misfires, the employee shall wait at least 30 seconds, then try firing it again;
- If it still will not fire, the user shall wait another 30 seconds so that the faulty cartridge is less likely to explode then carefully remove the load. The bad cartridge shall be put in water;
- Suitable eye and face protection are essential when using a powder-actuated tool;
- The muzzle end of the tool shall have a protective shield or guard centered perpendicularly on the barrel to confine any flying fragments or particles that might otherwise create a hazard when the tool is fired. The tool shall be designed so that it will not fire unless it has this kind of safety device;
- All powder-actuated tools shall be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force; and
- If the tool develops a defect during use, it shall be tagged and taken out of service immediately until it is properly repaired.



Self-Check -3	Written Test
----------------------	---------------------

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

1. What are the safety requirement while using power tools? **(5 marks)**



Note: Satisfactory rating 3 points

Unsatisfactory below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



Information Sheet-4	Identifying Common Faults and/or Defects In Power Tools
----------------------------	--

4.1. Identify and mark faulty or unsafe power tools for repair before, during and after use

4.1.1. Guards

Hazardous moving parts of a power tool need to be safe guarded. For example, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment shall be guarded if such parts are exposed to contact by employees. Guards, as necessary, shall be provided to protect the operator and others from the following:

- Point of operation;
- Nip points;
- Rotating parts;
- Flying chips; and
- Sparks.

Safety guards shall never be removed when a tool is being used. For example, portable circular saws shall be equipped with guards. An upper guard shall cover the entire blade of the saw. A retractable lower guard shall cover the teeth of the saw, except when it makes contact with the work material. The lower guard shall automatically return to the covering position when the tool is withdrawn from the work.

4.1.2. Safety Switches

The following hand-held power tools shall be equipped with a momentary contact “on-off” control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than two inches in diameter, disc and belt sanders, reciprocating saws, saber saws and other similar tools. These tools also may be equipped with a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on. The following hand-held powered tools may be equipped with only a positive “on-off” control switch: platen sanders, disc sanders with discs two inches or less in diameter; grinders with wheels two inches or less in diameter; routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks quarter inch wide or less.



Other hand-held powered tools such as circular saws having a blade diameter greater than two inches, chain saws and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch that will shut off the power when the pressure is released.

4.2. Electric Tools

Employees using electric tools shall be aware of several dangers with the most serious being the possibility of electrocution. Among the chief hazards of electric-powered tools are burns and slight shocks which can lead to injuries or even heart failure.

To protect the user from shock, tools shall either have a three-wire cord with ground or be grounded, be double insulated, or be powered by a low-voltage isolation transformer. Anytime an adapter is used to accommodate a two-hole receptacle, the adapter wire shall be attached to a known ground. The third prong shall never be removed from the plug. Tools shall be shut down before cleaning, repairing or oiling. These general practices shall be followed when using electric tools:

- Electric tools shall be operated within their design limitations;
- Gloves, eye protection, and safety footwear are recommended during use of electric tools;
- When not in use, tools shall be stored in a dry place;
- Electric tools shall not be used in damp or wet locations; and
- Work areas shall be well lit, even if this means the operators has to augment the work surface illumination by other appropriate means.



4.3. Powered Abrasive Wheel Tools

Powered abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments or excessive dust. Before an abrasive wheel is mounted, it shall be inspected closely and sound- or ring-tested to ensure that it is free from cracks or defects. To test, wheels shall be tapped gently with a light non-metallic instrument. If the wheel sounds cracked or dead, they could fly apart in operation and shall not be used. A sound and undamaged wheel will give a clear metallic tone or “ring.” To prevent the wheel from cracking, the user shall be sure it fits freely on the spindle. The spindle nut shall be tightened enough to hold the wheel in place, without distorting the flange. Follow the manufacturer’s recommendations. Care shall be taken to ensure that the spindle wheel does not exceed the abrasive wheel specifications. Due to the possibility of a wheel disintegrating (exploding) during start-up, the employee shall never stand directly in front of the wheel as it accelerates to full operating speed. Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of breakage. In addition, when using a power grinder:

- Always use eye protection and a dust mask;
- Turn off the power when not in use; and
- Never clamp a hand-held grinder in a vise.

4.4. Pneumatic Tools

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders. There are several dangers encountered in the use of pneumatic tools. The main one is the danger of getting hit by one of the tool’s attachments or by some kind of fastener the worker is using with the tool. Eye protection is required and face protection is recommended for employees working with pneumatic tools. When sanders are used, dust masks shall also be worn. Noise is another hazard. Working with noisy tools (e.g. jackhammers) requires proper, effective use of hearing protection. When using pneumatic tools, employees shall ensure they are fastened securely to the hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool will serve as an added safeguard.

A safety clip or retainer shall be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel. Screens shall be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns,



staplers or air drills. Compressed air guns shall never be pointed toward anyone. Users shall never “dead-end” it against themselves or anyone else. It is recommended to use air guns equipped with safety tips that have relief ports to reduce pressure if blockage or dead-ending occurs.

4.5. Powder-Actuated Tools

Powder-actuated tools operate like a loaded gun and shall be treated with the same respect and precautions. The use of powder-actuated tools is prohibited until approved by Environmental Health and Safety.

4.6. Hydraulic Power Tools

The fluid used in hydraulic power tools shall be an approved fire-resistant fluid and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed. The manufacturer’s recommended safe operating pressure for hoses, valves, pipes, filters and other fittings shall not be exceeded.

4.7. Ergonomics

The use of hand and portable power tools may be the source of certain ergonomic stressors, which may lead to the development of musculoskeletal disorders



Self-Check -4	Written Test
----------------------	---------------------

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

1. What shall the guards provided to protect the operators? **(2 marks)**
2. What are the general guide lines when using electric tools? **(2marks)**
3. What are the precautions when using power grinder? **(3marks)**



Note: Satisfactory rating - 4 points

Unsatisfactory - below 4 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____



5.1. Operational maintenance tools

- Hand sharpening and cleaning
- Lubricating
- Tightening simple tool repairs and adjustments using engineering principles
- Routine maintenance



Self-Check -5	Written Test
----------------------	---------------------

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

1. What kind of maintenance will be carried out for power tools? And explain them?
(5marks)



Note: Satisfactory rating – 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



Information Sheet-6

Storing Power Tools

6.1. Store power tools safely at appropriate location

Power tools can be hazardous when improperly used. There are several types of power tools, based on the power source they use: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated. The following general precautions shall be observed by power tool users:

- Never carry a tool by the cord or hose;
- Never remove prongs from any cords;
- Never stand in or near water when using tools;
- Always use a Ground Fault Circuit Interrupters (GFCI) with electrical tools if working in a wet environment;
- Never “yank” the cord or the hose to disconnect it from the receptacle;
- Keep cords and hoses away from heat, oil and sharp edges;
- Replace all frayed and/or damaged extension cords. Do not try to tape cords;
- Disconnect tools when not in use, before servicing and when changing accessories such as blades, bits and cutters;
- All observers shall be kept at a safe distance away from the work area;
- Secure work with clamps or a vise, freeing both hands to operate the tool;
- Avoid accidental starting. The worker shall not hold a finger on the switch button while carrying a plugged-in tool;
- Tools shall be maintained with care. They shall be kept sharp and clean for the best performance. Follow instructions in the user’s manual for maintenance, lubricating and changing accessories;
- Maintain good footing and balance;
- Avoid loose fitting clothes, ties or jewelry such as bracelets, watches or rings, which can become caught in moving parts;
- Use tools that are either double-insulated or grounded (three-pronged);
- Keep work area well lit when operating electric tools;
- Ensure that cords and hoses do not pose as a tripping hazard; and
- All portable electric tools that are damaged shall be removed from use and tagged “Do Not Use”. This shall be done by supervisors and/or employees.



6.2. Maintain accurate records and reports

- Communicate information with operator's and supervisor's documentation
- Records and documentation of receipts, dispatch and reporting
- Complete relevant documents, records and report.



Self-Check 6	Written Test
---------------------	---------------------

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

1. Write some precautions of power tools? **(5marks)**



Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



Operation Sheet 1

Using power tools

Method of using power tools

Step 1- Read the information sheet well

Step 2- Prepare the required material Use gloves and appropriate safety footwear when using electric tools.

Step 3- Check the functionality of the power tool and parts

Step 4- Plug to the electric plug

Step 5- Operate electric tools within their design limitations

Step 6- Use them properly and unplug after work

Step 7- clean the area and keep them in their proper place.

Step 8- Store electric tools in a dry place when not in use.

Step 9- Do not use electric tools in damp or wet locations unless they are approved for that purpose.

Step 10- Keep work areas well lighted when operating electric tools.

Step 11- Ensure that cords from electric tools do not present a tripping hazard.



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: Clean the given tools and equipment.

Task 2: Using the given template, use different power tools and clean their waste produced and accumulated in a particular technology area, then identify whether these are for composting, recycling or disposal.



References

1. *Hand and Power Tools*, U.S. Department of Labor, Elaine L. Chao, Secretary
2. *Occupational Safety and Health Administration*, John L. Henshaw, Assistant Secretary, OSHA 3080, 2002 (Revised)