Cereal Processing

Level-III

Based on March 2019, Occupational Standards (OS) Version 2

Module Title: Operate Interrelated Processes in a Production and Packaging System

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Contents

LG#31	LO #1: Set up a production or packaging line for operation

Instruction sheet

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

- Confirming and fitting equipment for use
- Line setup tools and equipment
- Identifying and setting processing parameters
- Selecting or adjusting machine settings
- Entering processing or packaging parameters
- Checking and adjusting equipment performance
- Completing line setup production or packaging schedule
- Reporting maintenance requirement and ready line for operation
- Conducting work with workplace environmental guidelines
- Notifying relevant personnel for setup completion

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Confirm and fit equipment for use
- Line setup tools and equipment
- Identify and set processing parameters
- Select or adjust machine settings
- Enter processing or packaging parameters
- Check and adjust equipment performance
- Complete line setup production or packaging schedule
- Report maintenance requirement and ready line for operation
- Conduct work with workplace environmental guidelines

  Notify relevant personnel for setup completion

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
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1- Confirming and fitting equipment for use

1.1 Confirming equipment for use

Confirming is the mechanism of validating or accepting the equipment with the specification and standard as correctly fit packaging.

The purpose of confirming is:

- To give machine approval with respect to the specification
- to ratify or treaty the functionality of equipment or machine
- To make firm or firmer to resolve the problem
- to know and manage types of equipment and machine
- to give validation and assurance
- To remove doubt

Criteria of confirming and selecting of packaging material should be fit cereal products packaging. This criteria of equipment includes plastic, paper and paperboard (aluminum foils and laminates, tinplate, and tin-free steel), paper and paperboards, and plastics. Moreover, a wider variety of plastics have been introduced in both rigid and flexible forms. Today's food packages often combine several materials to exploit each material's functional or aesthetic properties. Packaging material advances in the consideration of environmental impact of packaging.

1.2 Fitting equipment for use

Packaging equipment is used to enclose or contain something act or process of putting something in a package or container. Mostly a matter of placing and filling plastic bags inside cardboard boxes.

Some cereals, such as torn wheat, are fairly resistant to damage from moisture. They may be placed directly into cardboard boxes lined with plastic but most cereals must be packaged in airtight, waterproof plastic bags within cardboard boxes to protect them from spoiling.

The important equipment used to fit the cereal product for packaging is:

- Paper board
- Printed fiber board.
- Aluminum cans and Metal
- Jute bags and sack
- Woven sacks with high density polyethylene
- Fiber bag (cotton, jute and sisal)
- cardboard boxes or cardboard boxes lined plastic
- airtight, waterproof plastic bags within cardboard boxes
- Wood fibers and high-density polyethylene film
- Flexible plastic films used for cereals in single packaging or multi-serving size packages with other packaging materials.

Figure 1: Paper bag

1.3 Operating principle of packaging

An automated machine packages the cereal at a rate of about 40 boxes per minute. The box is assembled from a flat sheet of cardboard, which printed with the desired design for the outside of the box. The bottom and sides of the box are sealed with strong glue/adhesive.

The bag is formed from moisture-proof plastic and inserted into the box.

The cereal fills the bag and the bag is tightly sealed by heat. The top of the box is sealed with weak glue which allows the consumer to open it easily. The completed boxes of cereal are packed into cartons which usually hold 12, 24, or 36 boxes and shipped to the retailer.

To ensure proper cooking and shaping, the temperature and moisture content of the cereal is constantly monitored. The content of vitamins and minerals is measured to ensure accurate nutrition information. Filled packages are weighed to ensure that the contents of each box are consistent.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: short answer

1. What is purpose of confirming the packaging equipment
2. Write types of packaging equipment used for the cereal packaging process
3. Write working principle of cereal packaging material

Test II: Choice

1. Which one of the following is grain packaging material

A. Paper board
B. Printed fiber board.
C. Aluminum cans and Metal
D. Jute bags and sack

2. From the following one is not the purpose of confirming the packaging material

A. To make firm or firmer to resolve the problem
B. to know and manage types of equipment and machine
C. to give validation and assurance
D. To remove doubt
E. none

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 8 points**

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

Information Sheet 2: Line setup tools and equipment

2.1 Introductions

Cereal processing equipment should be conformed base on the specification and standards of packaging material that fit to pack the cereal products. In every process the interrelate of line is required .The first step in line set up process equipment requires a process line or the specific way of equipment to be designed.

The pieces of equipment in a line must be identified, such as conveyors and elevators that connect with various unit operations of assembling the unit operations for all material and energy entering and leaving each step or unit operation.

Personal protective equipment, commonly referred to as “PPE”, is equipment worn to minimize exposure to a variety of hazards. Examples of PPE include such items as gloves, foot and eye protection, protective hearing devices (earplugs, muffs) hard hats, respirators and full body suits.

Figure1.Safety device

2.2 Flour processing machine

The flour milling process begins with cleaning the grain and tempering it by adding water. The tempered grain is ground in a series of roller mills to remove the bran and to cut the endosperm. The ground grain is sifted and separated into various sizes. The line set up of milling process is consider the following machine:

- Conveyor
- Elevator
- Silos and cyclone
- Cleaning machine(magnetic separator, destoner, spray machine
- Cyclone separators and dryers
- Conditioning machine
- Miller
- Sack stitchers, laminator weighing machine

2.3 Line setup of flour milling plant

Looking the following for a complete milling line setup of milling plant. Flour milling plants should be containing all types of flour milling component. Flour sifters, grain cleaning equipment, flour filling and all other necessary equipment for production of e.g. fine white flour or organic whole meal flour. Flour milling plants are also popular for milling of spelt

A conveyor system is a fast and efficient mechanical handling apparatus for automatically transporting loads and materials within an area. A conveyor system may use a belt, wheels, rollers, or a chain to transport product.

Screw elevator: is used for carrying raw materials from a lower level to an elevated level.

Conditioning machine is used to adjust the moisture of grai and to improve efficiency in the next process.

Filling machines or dosing machines are pieces of equipment used in food packaging. They measure a dose of processed food product by feed the product into be enclosed in bags, pouches, cartons, cans, jars, bottles and other types of packaging.

Packing machine: The bags are conveyed to the machine by a bag feeding roller. Bag gripping when a bag is detected by a proximity sensor, a vacuum bag loader picks up the pouch and transfers it to a set of grippers, which will hold the bag as it travels around the rotary stations.

Magnetic separator is the process of separating components of mixtures by using magnets to attract magnetic materials.

Cyclone separators are separation devices (dry scrubbers) that use the principle of inertia to remove particulate matter from flue gases.Cyclone separators is one of many air pollution control devices known as pre cleaners remove larger pieces of particulate matter.

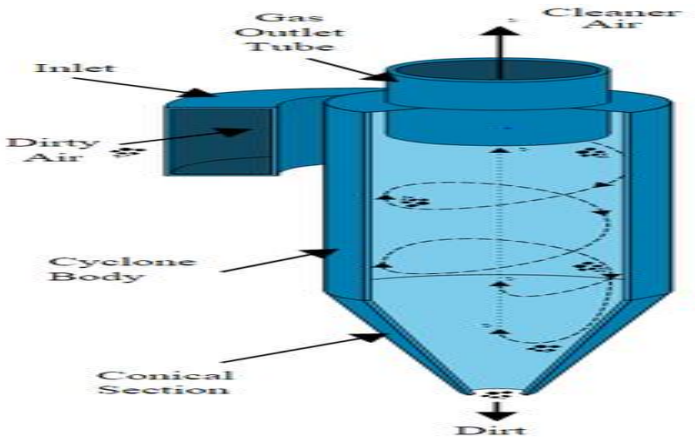


Figure 2.cyclone separator

- **Grain conditioner:** to remove dust, debris, stones, organic material, metals and any element other than the grain to be stored, resulting in a clean product that will maintain its quality over time.

Figure 3 .flour milling plant

2.4 bakery processing machine

A bread making **machine** or bread maker is a home appliance for turning raw ingredients into **baked** bread. It consists of a bread pan (or "tin"), at the bottom of which are one or more built-in paddles, mounted in the center of a small special-purpose **oven**

- Sifter
- Mixer
- Proofer
- Ovens and Scales

2.5 line composition bread making:

Mixing: production with "direct" doughs (without rest) for certain formats. Masses with autolysis, dough with incorporation of liquid or solid sourdough, rested doughs with fermentation in bowl. Fully automatic system.

Making: coming from one or more lines of lamination, in the case of very hydrated dough. Possibility of receiving lamination lines and forming lines by dividing, rounding, pre-fermented, forming for less hydration.

Controlled fermentation: in different techniques of transport and movement of the dough taking into technological, technical and space factors available. Movement of pieces on trays, peel board or product free of fixed support and circulating between the formation, fermentation and baking.

Handling: transport systems of different formats with suitable alternatives for the process to be performed, incorporating processing equipment for the requirements of each specific format. (Cutting systems, dosing systems for surface ingredients, product quality control and inspection systems at each stage of the process, etc.)

Baking: thermal oil furnace, with its special and characteristic cooking that defines a crisp product, in its correct degree of internal humidity, with thin crust and appearance. Oven developed in decks allowing a space in reduced plant for a high productive capacity. Bread is baked at 180-300 ^{0} C for 15-20 minute

Cooling. Special emphasis is given to points where you incorporate the technological alternative of vacuum cooling, which allows important technical and technological advantages, ensuring minimum contamination levels, unthinkable cooling times compared to ambient systems (40/60 minutes time) three(3)minutes vacuum cooling time, avoiding problems of collapse in the product and improving the cooking itself.

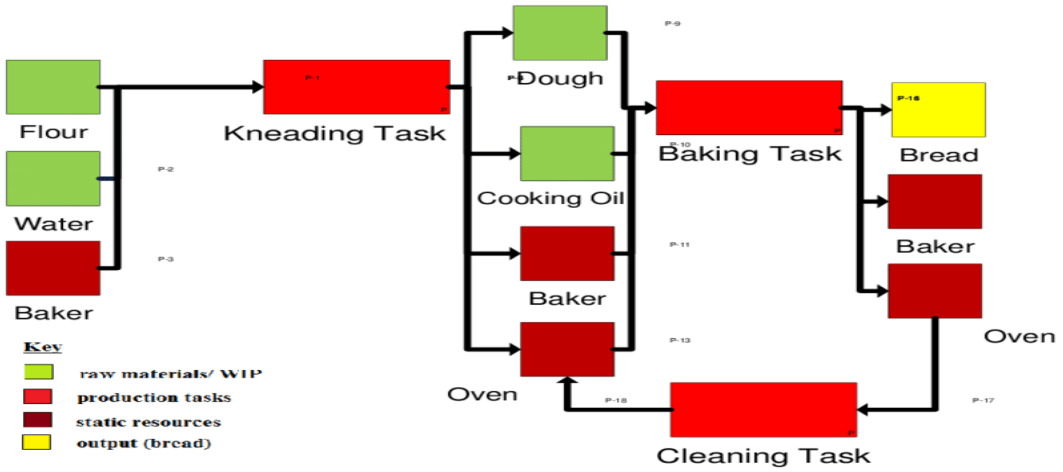


Figure4.bakery set up line

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short answer questions(

1. What is grain conditioning machine?(4 point)
2. Define the following machine(2point each)
   a) filling machine
   b) packing machine
   c) conveyor
   d) elevator

Note: **Satisfactory rating – 10 points** **Unsatisfactory - below 8 points**

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

Information Sheet 3- Identifying and setting processing parameters

3.1 Setting Processing parameters

Process Parameters (also called a process variable) are certain measures that refer to status of the process (their values indicate whether the process meets the plan or it needs adjustment).In order to obtain effective execution of the process its parameters should stay under continuous control. Process parameters are inputs to the process; process variables are outputs from the process.

3.2 Identifying processing parameters

- Dough consistency
- Ingredient Storage temperature
- Mixing Time
- Fermentation/Standing Time
- Temperature during mixing
- Dough Temperature
- Proving Time
- Baking time
- Baking temperatures
- Moisture
- Packaging labels
- Sealing during packing process
- Packing defects

The above processing variable are the controlling variable that attached on the packaging machine which adjusted during cereal processing with their range for the producing the required cereal products like bread, cake, pasta and others.

3.3 Setting processing variable of bakery

Baking temperature: 180°-220°C: This is probably the range you use most often and there's a reason for that. Temperatures over 300°C are where you begin to experience caramelization (browning of sugars) and the Maillard reaction (browning of proteins)
Dough Temperature: the desired dough is 24-26C (75-79F)

Mixing time: the mixing required more than 8 min for an optimum for the dry ingredients to hydrate and for the gluten in the flour to develop into a smooth and uniform texture is 10 minute

Bake time: the bread is baked at 15-20 minute

Relative Humidity: ferment properly the average dough requires a relative humidity of at least 75-80%, but it can vary depending on the variety of bread being baked.

Proving time: rest period or amount of time that fermentation occurs. Fermentation is the necessary step in creating yeast bread and baked goods where the yeast is allowed to leaven via fermentation causing the dough to rise**.** The proving time of dough is 1:30 hour.

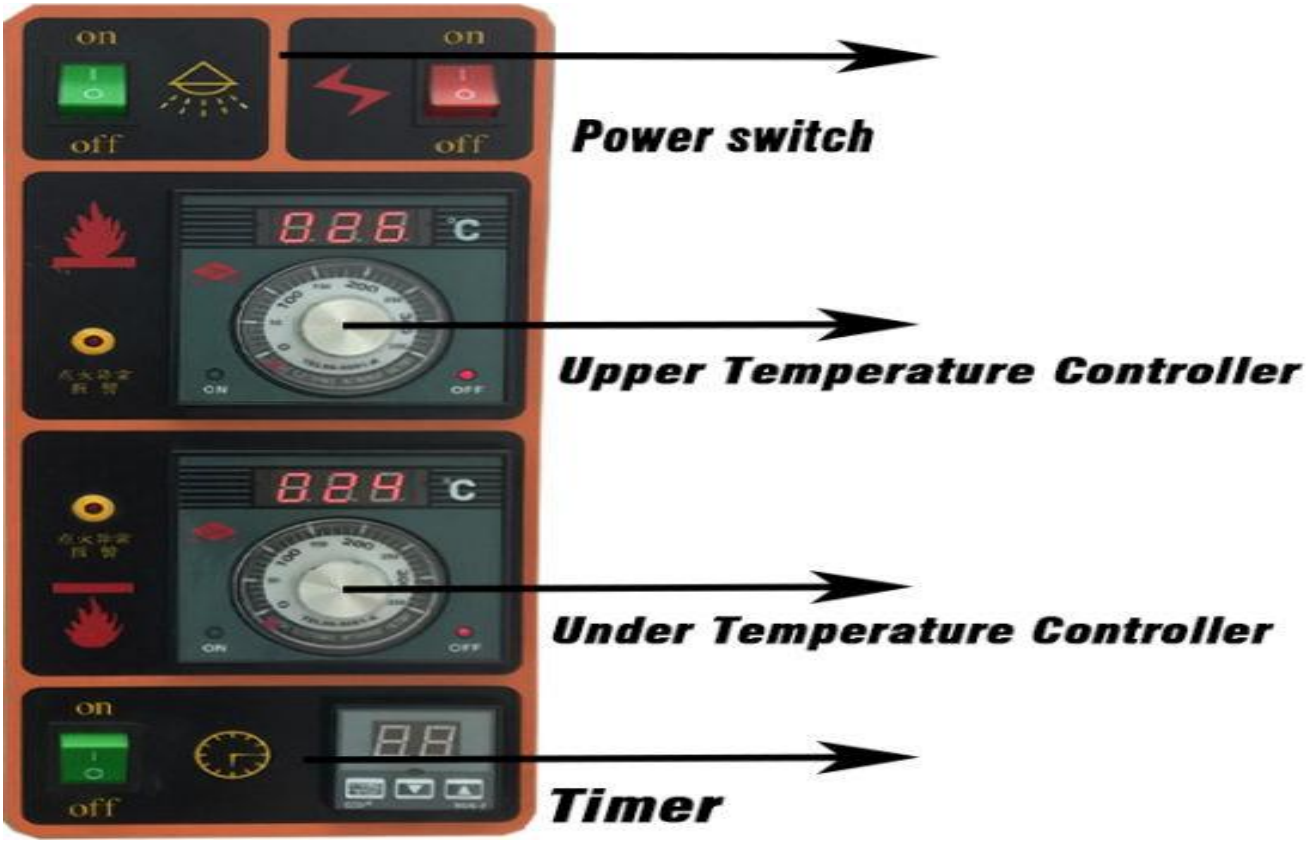


Figure 1. Electrical cotroller oven

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (3point each)

1. Write the controller or parameters of electric oven
2. At what temperature bread baking and proving?
3. What is relative humidity of bread?

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 4 - Selecting or adjusting machine settings

4.1 Selecting or adjusting machine settings

Adjustments can be critical to product output that deal with a number of different packaging machines. Whether semi-automatic or automatic, height adjustments on all packaging machinery should be quick and simple to make.

The selecting and adjusting criteria of machine depend on equipment parameters and process variables like temperature, pressure, time and humidity, speed throughout the process of line setup process in weighing, filling, sealing and coding machine

4.2 Machine Adjustment

Before allowing someone to adjust any machine you need to think about what risks are come and how can be manage. Before starting any operation, the operator should be check the main component of the equipment visually and identify faulty and unfit parts or components of the machine then adjust and fit all components of the machine identified based on operation procedure standards and adjusted according to the parameter specification and company standards.

4.2.1 Safety check

Check and make sure there is no foreign matter on the conveyer belt, elevator screw, filling and coding machine, Working table, packaging machine like laminator, packer and there is no other person around the machine to avoid employees injury.

4.2.2 Switch on the power

Open the door of the cabinet and connect the main breaker, close the cabinet, check to see if all thermostats temperature and power supply indicator lamp on the control board are normal, and see if the display of the human-machine interface is normal.

4.3 Basic operating principles of machine

The basic related accessories used by the system, including equipment adjustment points, checking equipment status, purpose of guards and range and location/alignment requirements of sensors and related instruction, specification and standards of equipment.

Faster filling machine can be achieved using a manual or semi-automatic filling machine which is adjustable for different fill-weights. Flour is released from a hopper into a weighing section and the correct weight is then dropped into a bag or sack

An auger carries flour from the mill to the weighing/bagging machine. It is important that this is set up correctly because the product feed rate of the auger affects the accuracy of the weighing/bagging machine.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (2 point)

1. What is adjusting machine
2. How to adjust the machine setting
3. Write the component of packaging machine

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

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

Information Sheet 5- Entering processing or packaging parameters

5.1 Entering processing or packaging parameters

Processing parameters should be set for processing variable output with the specification range to operate the required machine.

Most packaging machines are design within a standard framework or configuration based around a standard pack format. Within this framework, they can be customized in a number of ways:

- To process a range of sizes of pack
- To achieve a certain range of weights or volumes of product
- To include extra functions such as date coding, leaflet insertion
- To be compatible with other packaging machinery in the packaging line.

The machine operator should be following the following procedures to enter parameters during the packaging process. The specification should cover:

- Product type, characteristics and requirements
- product processing requirements(temperature ranges machinery will need to operate in)
- packaging and sealing materials requirements
- labeling materials and requirements
- pack shape and dimensions (stability simple shapes such as cylinders are easier to handle – and dimensions such as neck size)
- range of pack weights or volumes (degree of accuracy) required
- number, type and speed of changeovers required and output required
- legal requirements (legislation applicable to the machinery and the product)
- hygiene requirements (for aseptic processing of food products)
- level of compatibility with other machinery in the packaging line
- potential hazards
- power and installation requirements

- Maintenance, staff and training requirements.
- Formal quotations are then sought. Other considerations include
- the capital investment (a line could cost in excess of a million pounds)
- the quality and availability of support (e.g. access to spares and service engineers, quality of documentation and training for in-house staff)
- the timescale for design, construction installation and commissioning the
- Operation range of validation requirements.

Figure1. Process circuit controller

- **Barrier light**

An important requirement in selecting food packaging systems is the barrier properties of the packaging material. Barrier properties include permeability of gases (such as O2, CO2, and N2), water vapour, aroma compounds and light. These are vital factors for maintaining the quality of packaged foods.

Barrier Film is a liquid intended for use as a film-forming product that upon application to intact or damaged skin forms a long lasting waterproof barrier, which acts as a protective interface between the skin and bodily wastes, fluids, adhesive products, and friction.

- **Atmospheric packaging**

Modified atmosphere packaging (MAP) is a packaging system that involves changing the gaseous atmosphere surrounding a food product inside a pack, and employing packaging materials and formats with an appropriate level of gas barrier to maintain the changed atmosphere at an acceptable level for preservation of the food.

During packaging process the gas flushing out from the packaging material by sacking out the gas replaced by inert nitrogen gas. To limit collapse caused by CO2 absorption ◦ doesn't possess bacteriostatic activity. Not very soluble in water, used for displacing oxygen.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is modified atmospheric packaging
2. Write and explain the important cereal processing parameters

Test II: choice

1. Which of the following barrier properties or permeability of gases in packaging

A. Oxygen (O2) Carbon dioxide (CO2) D. nitrogen (N2) D. all

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

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

Information Sheet 6 - Checking and adjusting equipment

6.1 Checking and adjusting equipment performance

Checking is testing or evaluating machine/equipment performance for safely work before start the process to operate.

Adjusting is the correctness of the machine/ equipment efficiency and effectiveness before the work start in order to achieve the desired fit or result. **Performance and** measure the packaging line efficiency throughout packaging machine line if the equipment is operating at maximum cutting speed and feeding rate. These data points give you a measure of a piece of the packaging system but not necessarily an overall view of how effective the equipment/machine.

6.2 Equipment effectiveness

Overall Equipment effectiveness (OEE) is a measure of how well a manufacturing operation is utilized (facilities, time and material) compared to its full efficiency, during the periods when it is scheduled to run. It identifies the percentage of manufacturing time that is truly productive. An EE of 100% means that only good parts are produced (100% quality), at the maximum speed (100% performance), and without interruption (100% availability).

Measuring OEE is a manufacturing best practice. By measuring OEE and the underlying losses, important insights can be gained on how to systematically improve the manufacturing process. OEE is an effective metric for identifying losses, bench-marking progress, and improving the productivity of manufacturing equipment (i.e., eliminating waste).

If the packaging machine faces with problem it shows the emergency .so the operator should be:

- Check the problem happen
- Shut down emergency button
- Control the circulation

Figure 1. Checking and adjusting Temperature

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is the difference between checking and adjusting?
2. In processing if faulty machine is happen what you have to do?
3. What is over effectiveness efficiency?

Test II: Choice the following sentence

1. In cereal processing if the machine is face with problem what do you do?

A. shut down emergency C. Adjust the parameters

B. Identify the faulty D.all

2. What you have to adjust and check in packaging parameters

A. hole of empty bag B. diameter of packaging C. Temperature and speed D all

Test III: Fill black space

1……..a measure of how well a manufacturing operation is utilized (facilities, time and material)

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

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

Information Sheet 7- Completing line setup production or packaging schedule

7.1 Introduction

All the line setup is completed starting from raw bulk materials receiving machine up to storage of packed product in the container/machine part of your operation and every process between packaging machines are installed in the most appropriate equipment/machine.

7.2 Line setup production or packaging

The Packaging line consists of a group of packaging machine parts with control parameters that make together as a line with respectively to sequence. Typically the separate machine design and build by different component and all equipment linked together and controlled as a unit which receives product, container, lids, adhesive, labels, wrapping material that turns packaging will form, fill, seal and deliver a complete package.

Finally the product should be packed in order of packaging line correct weighed, filled and sealed into paper or polythene bags or into polypropylene, multi-wall paper or cotton sacks for bulk sales in a manual or semi-automatic bagging machine system for retail sale. The complete line is printing machine, coding, labeling, sealing and delivering machine to the storage area up to maturation stage.

Auger fillers can be used for filling bags and sack with powdery and granular materials. Products such as, powder form, ready to dough can be easily filled with these machines.

Screw conveyor: is a piece of conveying equipment that doesn't contain any flexible traction components. The impetus generated by the rotating screw blade is used to move materials for a short distance in a vertical or inclined direction.

Hopper: is a conical form of milling machine fill the grain products.

Example Complete line for pasta packing is as following

- Special feeding conveyor in length, suitable for long pasta with double chains, internal blades, product gliding plane in stainless steel and pneumatically-running paring device made in plastic material
- driving composed of couple of wheels and longitudinal welders
- Cross welding by impulse-operating bars in width
- variable bag length
- Reel-holding support protruding from the bottom, max width of film.
- Out coming material in length
- device enabling to stop the machine when welders are open
- optic eye device for centered-printing
- ink-jet printing device
- electric control panel manufacturing

Figure1.Pasta Packing Machine

The machine is loaded with rolls of film used for blister forming process and the other (the laminating film) is used for its top closure. The forming film is warmed up, after which it is formed into the desired shape via a mould (forming die).The product is dosed in the formed blisters. The filled blister is top closed with the laminating film. During the last stage of the process, the blister is cut and separated from the waste material.

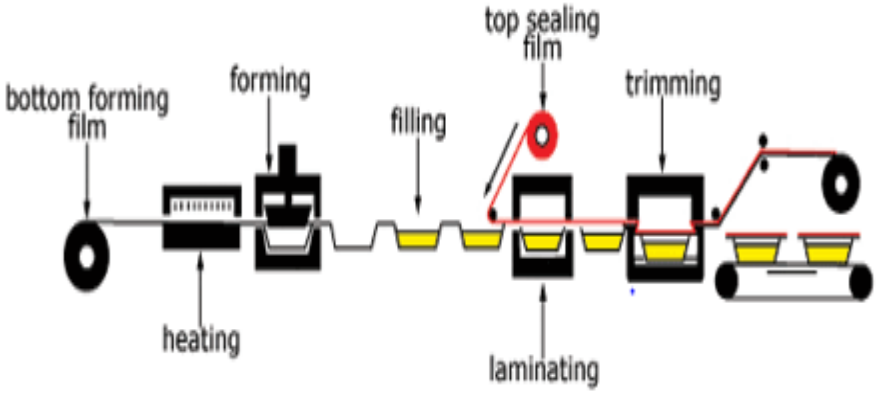


Figure 2.Complete Setup line of pasta

The shape of the pasta and macaroni formed or molded by the following dies by adjusting size and speed of cutting pasta and macaroni.

Figure 3.pasta and macaroni die

Finally after the packaging is completed through the above process the finished batch of packaging the format of employees.

Table 1.packing list

PACKING LIST

ORDER #

DATE

SHIPPED TO

NAME

ADDRESS

CITY, STATE, ZIP

NOTE:
When referring to this shipment be sure to give order # and shipping date.

DATE ORDERED	CUSTOMER ORDER NUMBER	DATE SHIPPED	ATTENTION
SHIPPED VIA	CONTAINER NUMBER	OUR INVOICE NUMBER	

#	ITEM NUMBER	QUANTITY	SHIPPED	BACKORDERED	DESCRIPTION	UNIT WEIGHT	TOTAL WEIGHT
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Comments

PACKED BY

Self-Check – 7	Written test

Name…… ID……Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test: Short Answer Questions(10 point)

1. Write component of packing machine
2. Write line set up of packaging component in flour milling
3. Define screw conveyor in cereal process
4. Define filling machine
5. Complete line set up of pasta

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

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

Information Sheet 8- Reporting maintenance requirement and ready line for operation

8.1 Reporting maintenance requirement

Machine maintenance should be performing using the required resources in order to run the function of equipment/machine for the operation. The important resources include labor, parts, materials, and tool costs.

Monthly packaging maintenance report is established & maintained to ensure the maintenance for packaging system is conducted properly according to the schedule of packaging machine/equipment maintenance report notified for recording information, performed task's activities as per required repairing, maintaining, services and replacement to complete the task of packaging system.

8.2 Ready packaging line for operation

After the machine is maintained it should be ready for the packaging system.

Every each machine line should be ready for the packaging process from the input of raw material to the end when the every sequence of the machine properly set with correct parameter and specification. In most food production and packaging systems, food products move between processing plants to retail outlets and to consumers.

The automatic macaroni line capacity put the amount product by batch or continuous extruders equipped with vacuum extrusion devices and static or continuous dryer depend on the customer's specific requirement

Figure1. Macaroni making line

Self-Check – 8	Written test

Name…… ID……Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test: Short Answer Questions

1. Write maintaining requirement
2. Write packaging line packing operation

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

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

Information Sheet 9- Conducting work with workplace environmental guidelines

9.1 Work place environmental guidelines

Working conditions areas covers welfare facilities, ventilation, cleanliness, space, lighting and temperature. You have to ensure your workplace health, safety and Welfare Regulations of the workplace environment.

Workplace hazards include slippery floors, loose floor, sharp knives, as well as hazardous materials. It is important for all employees to be aware of hazards, even if they seem obvious. Employers should have to provide information and training on any safe work procedures related to the work site. Safe work procedures are specific directions for doing a task or operating equipment that may pose a risk or hazard to the worker.

The workers should have to ask their supervisor if there are any safe work procedures they need to be aware of instructions they should be following. One of the main hazards in any workplace are cleaning equipment and machine, some of which are everyday products that a person may not regard as hazardous, such as sanitizers and household cleansers.

9.2 Legislative requirements

Supplier labels when a supplier packaging a product for distribution and sale that supplier must prepare a label that provides the following pieces of
Information:

- Product identification
- Supplier identification
- Hazard symbols
- Risk phrases
- Precautionary statements
- First aid measures

9.3 Work place requirements.

Work Layout: The layout of the workplace is required to allow persons to enter and exit the workplace and move within safely, normal work conditions and in an emergency.

Entry and Exit: Entries and exits are required to be safe to allow impeded access and egress for all workers trainees and visitors including those with special needs.

In particular:

- entries and exits should be slip resistant under wet and dry conditions
- walkways to be at 300m wide and kept free of furniture or other obstructions
- Walkways, boundaries or pathways shall be marked with 50mm wide with a contrasting colour e.g. white or yellow.
- handrail should be provided on or at least one side of every staircase
- separate entry and exits for mobile equipment e.g. forklifts or trucks, and pedestrians are to be provided
- Power operated doors and gates should have safety features to prevent

Work Areas The layout of the work area should be designed to provide sufficient clear space between furniture, fixtures and fittings. So workers can move freely without strain or injury also evacuate quickly in case of an emergency.

In determining how much space is required, the following should be considered:

- the physical actions needed to perform the task
- the need to move around while working
- whether the task is to be performed from a sitting or standing position
- access to workstations
- Equipment to be handled and the PPE that may be worn.

Floors and surfaces: Floor surfaces shall be suitable for the work area and be chosen based on the type of work being carried out at the workplace, as well as the materials used during the work process, the likelihood of spills and other contaminants, including dust and the need for cleaning. In general:

- floors shall be free from slip or trip hazards e.g. cables, uneven edges, broken surfaces
- floor surfaces shall have sufficient grip to prevent slipping, especially in areas that may become wet or contaminated
- carpet shall be properly laid without loose edges or ripples and should be well maintained
- Floors should be strong enough to support loads placed on them

Workstations: should be designed so workers are comfortable undertaking their task and allow for a combination of sit and standing tasks. For tasks undertaken in a seated position, workers should be provided with seating that:

- Provides good body support, especially for the lower back
- Provides foot support, preferable with both feet flat on the floor
- Allows adequate space for leg clearance and freedom of movement
- Fully adjustable to accommodate different size workers (e.g. Seat height, back rest height and back rest tilt adjustments) and should not tip or slip
- Chairs shall be fitted with castors for carpeted surfaces

Lighting sufficient lighting is required to allow safe movement around the workplace and to allow workers to perform their job without having to adopt difficult postures or strain their eyes to see. Emergency lighting is to be provided for the safe evacuation of people in the event of an emergency. The following factors are to be taken into account:

- The nature of the work activity and hazards and risk in the workplace
- The work environment
- Illumination levels, including both natural and artificial light
- The transition of natural light over the day and Glare

Air quality to be adequately ventilated fresh air drawn from outside the workplace, uncontaminated from flues or other outlets and be circulated through the workplace.
An air-conditioning system should:

- Provide a comfortable environment air movement
- Prevent the excessive accumulation of odors

Reduce the levels of respiratory by-products, especially carbon dioxide, and other indoor contaminants that may arise from work activities

Self-Check – 9	**Written test**

Name…… ID……Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write the important labeling requirement
2. Write workplace requirement

Test II: Choice

1. Which of the following is a piece of information supplied for the labeling?

A. Product identification

B. Supplier identification C. Hazard symbols D. Risk phrases E. all

2. Which of the following suitable for workstation?

A. Provides good body support

B. Allows adequate space for leg clearance

C. freedom of movement and Fully adjustable

D. Provides foot support

3. ……..to be adequately ventilated fresh air drawn from outside the workplace, uncontaminated

A. Air Quality B. Sufficient lighting C. Workstations D. all

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

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

Information Sheet 10- Notifying relevant personnel for setup completion

10.1 Notifying relevant personnel for setup completion

All the above set up completion setup is notified based on the following the following criteria. The important notification is approving/announcing packaging line for a setup of a machine completion for operation.

Set up completion should be notified based on the following:

- Manageable personnel file of operator/employees
- Employees personnel files
- Quality control and quality assurance of packaging line
- Personnel ergonomic employer
- Good manufacturing practice
- Maintenance type of packaging line
- Relevant entities operator, an employer, parameter factors that you apply.
- identifying time of packaging and resources that to be directed toward improved performance equipment/machine and service that delivery up to end result

Personnel ergonomic employer

Packaging ergonomics applies to the complex human factors of packaging design. Ergonomics means well-designed, usable, user-friendly, safe and comfortable to use. For packaging design-tech, ergonomics is a topic of primary concern. Pack begins its design process with the consumer-user in mind.

Manageable personnel file of operator/employees

Employers should keep all documented job such as recording, documenting, performance, disciplinary actions and job descriptions in an employee's general personnel file. Consider whether the document would be relevant to a supervisor who may review this file when making employment decisions.

Employees' personnel files

Employees personnel files are relevant for the notifying the packaging line operation in order to know who set the line and operate equipment.Name of employees, place of birth date,

Quality control and quality assurance of packaging line

Completion set up should be notified base on quality of assurance responsibility, standard operation procedure(SOP) and control use of starting materials, stages of manufacture and packaging, ensure packaging and check before release, inspection and monitoring system of completion.

Self-Check – 10	Written test

Name…… ID……Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test: Short Answer Questions

1. Discuss the relevant personnel for setup completion
2. How to notify the complete line set up for the manager in order to get the approval
3. For who you announce relevant line complete

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

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

Operation sheet1: Technique of adjusting machine settings

Procedure 1: Perform adjusting machine setting

Step 1.wear and use appropriate PPE

Step2.check all accessory service to conduct the adjusting machine

Step3.Set the machine manual or automatically

Step4.test, analyze the machine with tester equipment

Step5.read and interpret the displayed machine

Step6 record displayed number on screening

Step7.adust alignment of packaging line depend on the capacity

Operation sheet 2: methods of enter processing or packaging parameters

Procedure 2.Perform enter parameters/process variables

Step 1.Wear the appropriate PPE

Step2.identify the types of parameters or processing variable

Step3.identify the types of products to packed

Step4.understand the protection requirement

Step5.choose appropriate packaging material

Step6.identify range of processing variable

Step7.put/fill range of variable in number

Step8.enter the value of parameters/process variable

Step9.run the machine

Operation sheet 3. Methods of Check and adjust equipment performance

Procedure 3. Methods of Checking and adjusting equipment performance

Step1.Wear appropriate PPE

Step2. Visual inspection of the machine

Step3.testing/analyzing the machine efficiency

Step4.obtain the efficiency and faulty of machine

Step5.evaluate the faulty/problems of machine

Step 6.solve the problem/report the faulty of the machine

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1 hour. The project is expected from each student to do it.

Task1. Perform adjusting machine setting

Task2. Methods of enter processing or packaging parameters

Task3. Perform and evaluate the equipment performance

LG #32	LO2: Prepare the production and packaging system for operation.

Instruction sheet

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

- Identifying and confirming equipment *status* and cleaning requirements
- Loading or positioning materials, ingredients and/or product
- Carrying out pre-start checks
- Checking and adjusting equipment performance.
- Making equipment ready and safe to operate

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Identify and confirm equipment *status* and cleaning requirements
- Load or position materials, ingredients and/or product
- Carry out pre-start checks
- Check and adjust equipment performance.
- Make equipment ready and safe to operate

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
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1: Identifying and confirming equipment status and cleaning requirements

2.1 Confirming equipment status

Equipment status is an operational status of a piece of equipment consisting of a status indicator and status character for healthy emergency. Criteria of equipment status should be indicating characteristics of healthy emergency.

The main status of packaging machine like weighing, filling sealing/packing machine should be checked before going to operation in packaging system. The operator should be identifying the efficiency and performance of machine with Safety and healthy, inspection, electrical safety, faulty types and Maintenance types.

2.2 Cleaning requirements

Cleaning is the process of removing debris and some oil from the components of machine and other types of soil and dust from surfaces as dish, dust, glass or cutting board. Cleaning is done with a cleaning agent that removes food residue or other substance. The right cleaning agent must be selected because not all cleaning agents can be used on food-contact surfaces. A food contact surface is the surface of equipment or machine utensil that food normally comes in to contact.

2.3 Methods of cleaning

- Manual
- Mechanical Cleaning

2.31. Manual cleaning

Manual cleaning do not require mechanized or electronic equipment

- Sweeping: broom, dustpan, a trash bag and a stocked public space cleaning cart.
- Dusting: Cloth duster, Micro Fiber Cloths, Feather duster
- Damp dusting: removing dust particle.
- Spot Mopping: Mop & bucket or a mop- wringer trolley, cold water, & a very dilute solution of neutral detergent if necessary.

- Wet mopping / damp mopping: floor cleaner, wet mop & bucket or mop- wringer trolley, squeegee, & detergent solution.
- Manual Scrubbing: scrubbing brush, mild detergent, bucket,water, & mop
- Manual polishing: Use proprietary polish for floor or surface, clean cotton rags.
- Spot Cleaning: Cleaning Cloths, solvents, cleaning agents, brushes etc.

2.3.2 Mechanical Cleaning:

- These utilize equipment powered by electricity
- Vacuum Cleaning: a stiff broom, wet/dry vacuum cleaner with attachments and a mild detergent for wet cleaning if necessary.
- Spray buffing: buffing machine, spray bag container, detergent, & finishing solution.
- Polishing: floor machine or brush remove some spillage, Vacuuming or dust-mopping Scrubbing: removing debris
- Stripping: remove waste
- Dry Cleaning: removed non-aqueous medium using a chemical solvent other than water by a washing machine and clothes dryer.
- Sanitizing: treatment of a cleaned surface with a chemical or physical agent to destroy disease spoilage causing organisms. Reduces total waste or residue to a safe level

2.3 Cleaning agent

Detergents: these are cleaning agents or substance used to wash table wares, surfaces, and equipment. Example: soap, cleaners, acids, volatile solvents and abrasives.

Solvent cleaners: commonly used on surfaces where grease has burned on. Ovens and grills are examples of areas that need frequent degreasing. These products are alkaline based and formulated to dissolve grease.

Acid cleaners: removing mineral deposits and detergents cannot eliminate such as scale in washing machines and steam tables, lime build up on dishwashing machines and rust on shelving. (Phosphoric acid, nitric acid,etc) .**Abrasives**: used to remove heavy accumulations of soil that is difficult to remove with detergents, solvents and acids. Carefully used to avoid damage to the surface being cleaned.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test: Short Answer Questions

1. Write important cleaning agent
2. What is cleaning?

Test II: Choice

1. Which of the following is manual cleaning?
   A. Sweeping of broom and dustpan
   B. Dusting of Cloth duster and Micro Fiber Cloths
   C. Damp dusting
   D. all
2. Which of the following is mechanical Cleaning utilize equipment
   A. Vacuum Cleaning of wet/dry vacuum cleaner with detergent
   B. Spray buffing of solution
   C. Scrubbing: removing debris
   D. All
3. Which of the following is cleaning agent
   A. Detergent
   B. Solvent cleaner
   C. Acid cleaner
   D. Abrasive
   E.
4. Which of the following is explain the equipment status
   A. Safety and healthy
   B. Maintenance types
   C. Electrical safety
   D. Inspection

Note: **Satisfactory rating – 15 points** **Unsatisfactory - below 15 points**

Information Sheet 2- Loading or positioning materials, ingredients and/or product

2.1 Loading or positioning materials, ingredients and/or product

Loading is moving packaging material, ingredient/product from processing line location to the packaging line for packing using loading equipment like post design, leachable hooks, suspended bulk bags, filling nozzle, inflable neck seal, load cell weigh and controller, vibration facility for a products deaeration, compaction to provide stable loads to storage transportation with forklift.

Different food and grades should be kept separately and loaded into a particular place to avoid for oxidative quality reasons. It is preferable to transfer different food and grades through segregated lines. Where a number of products are transferred through a common pipeline system, the system must be cleared completely between different products or grades. The order of loading and discharge should be carefully chosen to minimize adulteration.

The temperature is chosen according to food type and also to minimize damage to the food. Flour transfer through different plant line setup by controlling the parameters like temperature, pressure, speed, shear of fluidized bed for subsequent handling, machining, transport, or storage.

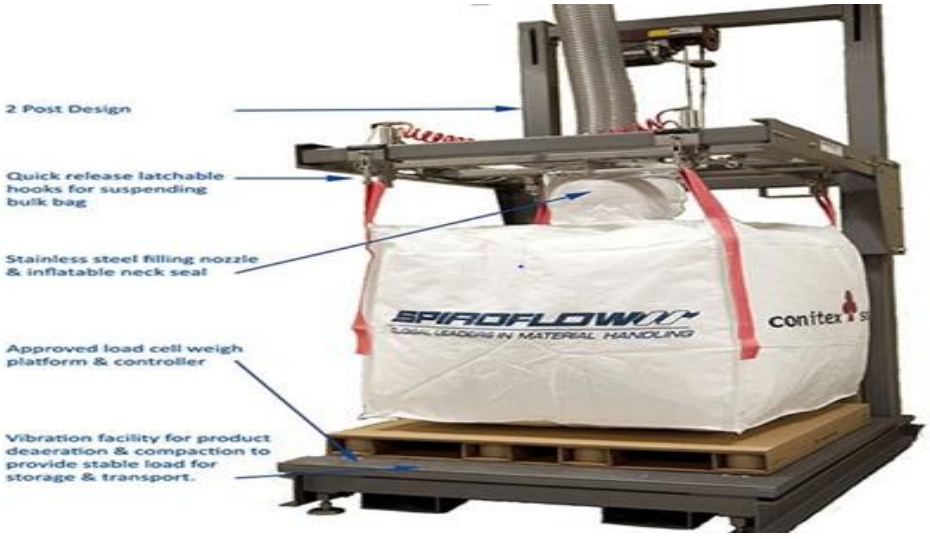


Figure 1. Load cell weigher

In packaging process the product is weighed and filled with filling machine which is programme controller weigh the amount to fill in the bagging machine.

Figure2. Macaroni loading machine

Sealing machine: is used to seal the product by adjusting heat with specification of packaging material of plastic (93^0 C -145^0 C)

Figure3. Electric sealing maching

Positioning equipment/machine

As compared to manual handling, the use of positioning equipment can raise the productivity of each worker when the frequency of handling is high, improve product quality and limit damage to materials and equipment when the item handled is heavy to hold and damage is likely through human error or in attention, and can reduce injuries when the environment is hazardous or inaccessible.

In many cases, positioning equipment is required for employees to justify by the ergonomic requirements of a task. Examples of positioning equipment include lift/turn tables, hoists, balancers and manipulators.

Figure 3. Flour processing plant

The systems and components used in the loading bulk flour tanker from storage silos are, dust collector, exhaust fan, flour storage silos, gravity diverter valve, loading spout, surge hopper and blower package.

Dust collector: is used to enhance the quality of the air released from industrial and commercial process by collecting dust and other impurities from air. The dust collector is an important machine in the grain process equipment. So how to control flour mill dust, a dust collector.Cyclone dust collector and multi cyclone dust collector.

Figure 4. Dust collector

Exhaust fan: is used to blowing the fresh air for conditioning process and aspiration process in cereal process

Figure 5. Exhaust Fan

Self-Check – 2	Written test

Name……ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is loading?

Test II: Choice

2. What equipment used after packing the flour products in a line operation

A .Conveyor B. Sealing machine C. Fork lifter D. All

2. Which of the following is the component of packing machine?

A. neck seal B. Hook suspending C. Load weigh cell D. all

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

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

Information Sheet 3- Carrying out pre-start checks

3.1 Introductions

In an industry, there are many types of works to be operated through packaging line. For example in agro food processing industry there is huge industrial machine and laboratory machine operation. So before going to operate machine/lab equipment you have to inspect/check whether it was in a good operating condition or not. So checking conditions of operating equipment has a vital role for the operator's safety and healthy quality of a product and also for equipment safety and healthy.

3.2 Carrying out pre-start checks

Pre start check is the evaluation of quality of product and performance efficiency of the packaging machine throughout line.

Operators always have to check the following parameters before going to manipulate the packaging operations:

- To facilitate Air inflow through dust collector.
- To vibrate platform to settle the contents inside and
- Sucking out dust particle
- To set parameter/variables (pressure, temperature, time and humidity)
- Identify faulty conditions of the machine
- Check efficiency of the machine, equipment and tools
- Analyze maintenance requirements
- Identify hazards types
- Check the safety and health of the equipment to be used before operation.

3.3 Conduct checks on Machine/Equipment

Before allowing someone to start using any machine you need to think risks and how can be managed. So, you should have to check its complete line with all safeguards fit and free from defects.

The first stage is complete wash the cereal or other grain. Because foreign material like little rocks, stones, seed or other material. If the cereal is not clean, it may cause

damage to the flour mill machine.Then washed product is passed through an aspirator to suck clean any substance that is less in weight than grain and could have escaped the first cleaning stage.Through physical and chemical grading analysis, sampling the cleaned cereal according to their defect content and those with the highest level mix together to produce high quality wheat flour product.

After processing of the cereal through the flour mill, we can get different classes of cereal flour. They are classified according to their quality content and usage.

In flour mills production process great precautions are taken to ensure that best flour grade is produced. Every process is conducted by qualified team who ensures that high levels of hygienic measures are taken.

Make sure the machine/ equipment:

- Safe equipment that should to be done when setting up, normal use, cleaning blockages, carrying out repairs and planned maintenance
- Properly switched off, isolated or locked-off before taking any action to remove blockages, clean or adjust the machine.

3.4 After packaging equipment Inspection Checklist

After the work is finished you should be:

- Clear any accumulated debris from the equipment's/machine
- Check signs of damage
- Check for leaking or pooled fluid around and under the machine before switch off or plug off the machine from cables or breaker
- Inspect the operator compartment and clear away any debris or obstructions.
- Properly switched off, isolated or locked-off before taking any action to
- Remove blockages,
- Clean or adjust the machine.

All these can be accomplished by investigating.

3.5 packaging system components

Packaging component" means any individual assembled part of a package such as date printing, conveyor, sealing but not limited to any interior or exterior blocking, bracing, weather proofing, exterior strapping, coatings, closures, inks and labels.

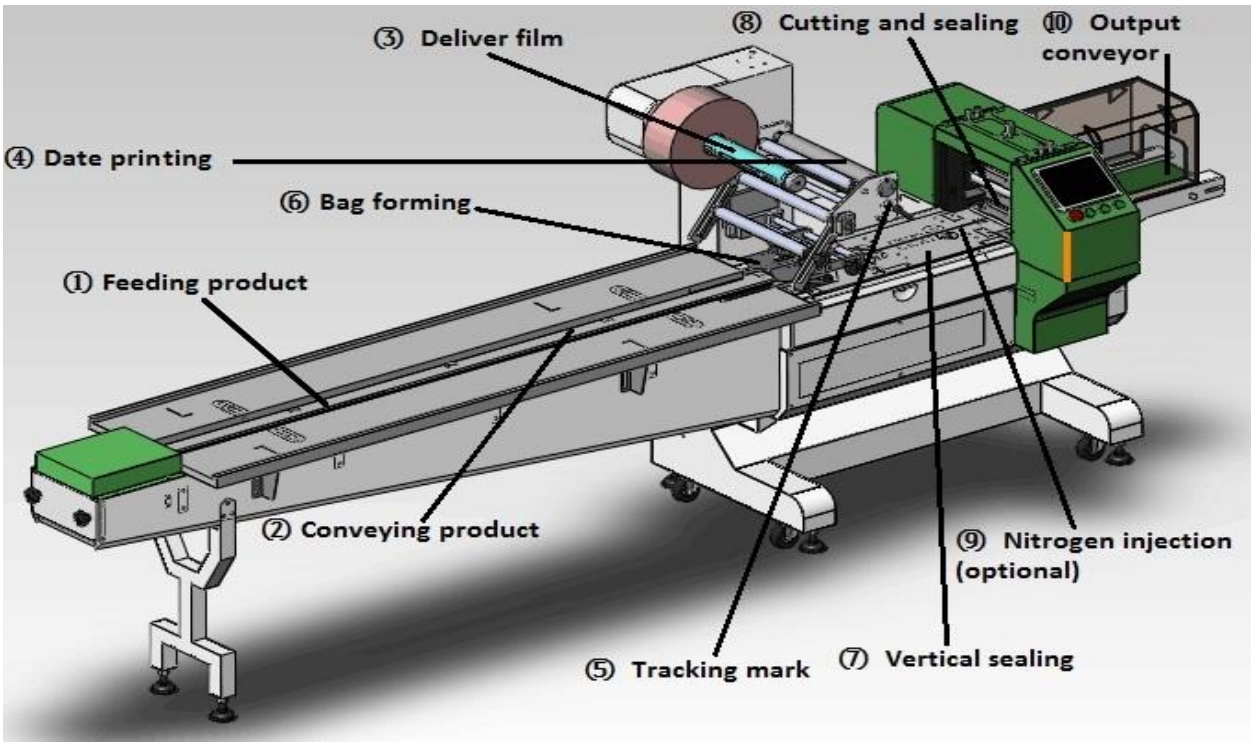


Figure 1.system packaging

N.B component indicates as

1) Feeding product
2) Conveying products
3) Deliver film
4) Date printing
5) Tracking mark
6) Bag forming
7) Vertical sealing
8) Cutting and sealing
9) Nitrogen injection
10) Output conveyor

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: short answer

Test II: Choice

1. From the following parameters which one is manipulated by operator before start to the operation
   A. Facilitate air inflow
   B. Suck out dust particles
   C. Set the required parameters
   D. Check the efficiency of the machine
2. Which of the following is good equipment inspection of the after packaging is finished

A. Clean accumulated debris from the equipment

B. switch off or plug off the machine from cables or breaker

C. Inspect the compartment and clear obstructions. D. all

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

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

4.1 Checking and adjusting equipment performance

The performance of packaging machine should be checked before start the operation of packaging process and complete line setup.Evaluation of performance of packaging machinery should be measure the packaging line efficiency, effectiveness and its faulty throughput, if the equipment is operating at maximum speed check and adjust range.

There are several types of packaging machine available such as:-Sealing machine, Filling machine, wrapping machine, coding and labelling machines.

Figure 1. Inspecting machine

Performance of equipment should be:

- Calibrate machine according standards and follow manufacturer's instructions
- Calibrate of routine machine
- Validate performance with efficiency
- stability for temperature and controlled equipment

4.2 Overall equipment effectiveness

Overall equipment effectiveness (OEE) is a measure of how well a manufacturing operation is utilized (facilities, time and material) compared to its full potential, during the periods when it is scheduled to operate. You identify the percentage of manufacturing time that is truly productive. An OEE of 100% means that only good parts are produced (100% quality), at the maximum speed (100% performance), and without interruption (100% availability).

Measuring OEE is a manufacturing best practice. By measuring OEE and the underlying losses, important insights can be gained on how to systematically improve the manufacturing process. OEE is an effective measure for identifying losses and improving the productivity of manufacturing equipment (i.e., eliminating waste)

4.3 Total effective equipment performance

Total effective equipment performance **(TEEP)** is a closely related to measure quantifies of OEE against calendar hours.

A total effective equipment performance of 100% means that the operations have run with an OEE of 100% 24 hours a day and 365 days a year (100% loading). The generic form of OEE allows comparison between manufacturing units in differing industries. It is not absolute measure and is best used to identify scope for process performance improvement, and how to get the improvement.

OEE measurement is also commonly used as a key performance control (KPC) in manufacturing efforts to provide a success. During checking and adjusting evaluate the performance of the packaging machine effectively about their efficiency. Such machines are: Filling machine, sealing machine, Labeling machine. Strapping machines, wrapping machines and coding machines

Overall Equipment Effectiveness (OEE) is a combination of three factors:

- **Availability**- Making the right time (keeping the machine up and running, minimizing downtime)
- **Performance** - Making the right thing
- **Quality** - Making things the right way (no defects, rework, or waste)

Overall Equipment Effectiveness (OEE) is a measure of exactly where you can improve in your packaging line. Each of the three components of the OEE points to an aspect of the process that can be targeted for improvement.

OEE = (Availability)*(Performance)*(Quality) examples given below:

- (Availability= 86.6%)*(Performance=93%)*(Quality=91.3%) = (OEE=73.6%)

OEE = (Availability)*(Performance)*(Quality)

=86.6%*93%*91.3%=**73.6%**

4.4 Performance

Performance is the action or process of performing a task or function. So the Overall Equipment Effectiveness (OEE) performance represents the speed at which the machine is currently running as a percentage of its ideal speed, time, minor stop packaging line, and overall reduced operating speeds will negatively affect packing machine performance.

In the packaging equipment a changeover is adjusting a machine to accommodate different products. Changeovers mean the machine is offline and not producing, which equals money down the drain. So put away your tools, you won't need them.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. How to adjust and check the machine efficiency and effectiveness
2. What is change over in packaging machine

Test II: Fill the following black space

1……..is a measure of how well a manufacturing operation is utilized (facilities, time and material)

2…….. ……is the action or process of performing a task or function.

3. ……..is a closely related to measure quantifies of OEE against calendar hours

Test III: Choice

3. Which of the following factor is measure the overall Equipment Effectiveness (OEE)

A. Availability B. Performance **C.** Quality D. all

Note: **Satisfactory rating - 10 points Unsatisfactory - below 10 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 5 - Making equipment ready and safe to operate

5.1 Making equipment ready and safe to operate

The packing machine should be ready for operation and make to ensure the safe efficiency of equipment in order to operate within facility equipment by controlling of the pillars of managing risk**.** The criteria to make ready equipment for operation is evaluate the efficiency, performance, effectiveness and the overall functionality of the machine. The readiness of equipment/machine is carrying out the processes are verified to be in a safe condition for start and operation.

5.2 Operation principle of make equipment to ready for operation.

In order to make ready the equipment and machine you should be carry out the following:

- The operator ready for his own operate by attention.
- All packaging machine should be ready to start operation.
- Operators should understand cleaning techniques and procedure to operate.
- Operators should wear appropriate PPE without wear narrow clothing that could become caught in moving belts.
- The operator should understand all the packaging line set up for operation.
- Operators should be prevented from putting his hands into feed chutes and use an appropriate wooden tool provide for unblocking grain 'bridges' in equipment.
- No repair or maintenance should be carried out without power supply isolated from source.
- The area around the operation should have good lighting.
- All electrical equipment should be properly earthed.

If the operation is not kept clean the combination of a dusty environment and a spark from poorly earthed equipment could result in a dust explosion

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (6point)

1. Write the working principle of make equipment ready for operation.
2. In packaging process, what is responsibility of operator?
3. Before starting the operation how to make ready the machine for operation?

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

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

Operation Sheet 1 - Identifying and confirming equipment status and cleaning requirements

Procedure1- Techniques of cleaning and maintenance status

Step1.wearing appropriate personal protective equipment's (PPE) glove, eye glass, safety shoe, hair net.

Step2. Plug off all the removable parts of the equipment to be cleaned.

Step3. Sticky "to be cleaned" sticker on the equipment and transfer the removable parts to the designated washing area (water bath).

Step4. Apply clean in place (CIP) and clean out place (COP)

Step5.Clean the unmovable part of the equipment according company policy and procedure remove out the equipment after completion.

Step6. Reassemble all the cleaned removable parts of the equipment after assuring every part is dried.

Step7. Fix cleaned date and signed" sticker on the reassembled cleaned equipment.

Step8.The "Cleaned" sticker must identify previous batch being processed by the equipment.

Step9. Use the cleaned equipment within the date of cleaning. Wipe all product contact parts with clean lint-free cloth prior to next use.

Step10.If the equipment is not used within date of cleaning, sticky "to be cleaned" sticker on the equipment and perform cleaning procedure again before use.

Operation sheet 2:Techniques of Loading or positioning Ingredients and/or product materials

Procedures 2: Techniques of Loading or positioning Ingredients and/or product materials

Step1: Place the bag loops of empty bulk bag over the support arms or bag support hooks.

Step2: Attach the bag spout or liner over the inflatable neck seal.

Step3: Adjust the height of the bag support arms (if selected).

Step4: Inflate the neck seal to secure the bag spout or liner.

Step5: Inflate the bag or liner with air (or there is an added nitrogen option)

Step6: Commence filling by weight or volume.

Step7: Apply vibration (if required).

Step8: When the bag is filled to its target weight or volume, deflate the neck seal and tie the bag spout or liner closed.

Step9: Engage the automatic loop release (if selected).

Step10: Remove the filled bulk bag by forklift, pallet jack or roller conveyor

Operation sheet 3. Carryout prestart check of packaging equipment/machine

Procedure 3: perform Carryout prestart check

Purpose – to evaluate the functionality of the equipment or machine before operation

Step1.wear appropriate PPE

Step1.Observe the machine efficiency and effectiveness

Steps2.Visual inspections of important features prior to starting the machine

Step3 .Visual & function tests while the machine is turned on but stationary

Step4.Test the functions of machine during a short run

Operation sheet 4. Perform check and adjust equipment performance.

Procedure4. Performing checking and adjusting equipment performance

Step1.ware appropriate PPE

Step2.identify the types of equipment/machine

Step3.identify faulty/equipment variation/problem

Step4. Take corrective action

Step5.record the action

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **2** hour. The project is expected from each student to do it.

Task1. Perform techniques of cleaning and maintenance status

Task2. Apply loading procedure for packing

Task3.perform prestart check of the packaging machine

Task4. Perform equipment performance

LG #33	LO3: Operate and monitor the production and packaging system

Instruction sheet

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

- Starting up and operating the system
- Monitoring equipment components system and variation in operating conditions
- Troubleshooting procedures and problem solving techniques
- Reporting maintenance requirement
- Monitoring the production and packaging systems
- Identifying, rectifying and reporting product/process out of specification
- Maintaining the work area with housekeeping standards
- Conducting work with workplace environmental guidelines

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Start up and operate the system
- Monitor equipment components system and variation in operating conditions
- Troubleshoot procedures and problem solving techniques
- Report maintenance requirement
- Monitor the production and packaging systems
- Identify, rectify and report product/process out of specification
- Maintain the work area with housekeeping standards
- Conduct work with workplace environmental guidelines

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

4. Accomplish the Self-checks
5. Perform Operation Sheets 6. Do the “LAP test”

Information Sheet 1 - Starting up and operating packaging system

1.1 Introduction

System is a series of interrelated processes that must be coordinated and currently operated to produce the cereal product like flour and flour product that used for bread, cake, pastry, cookies and biscuit.

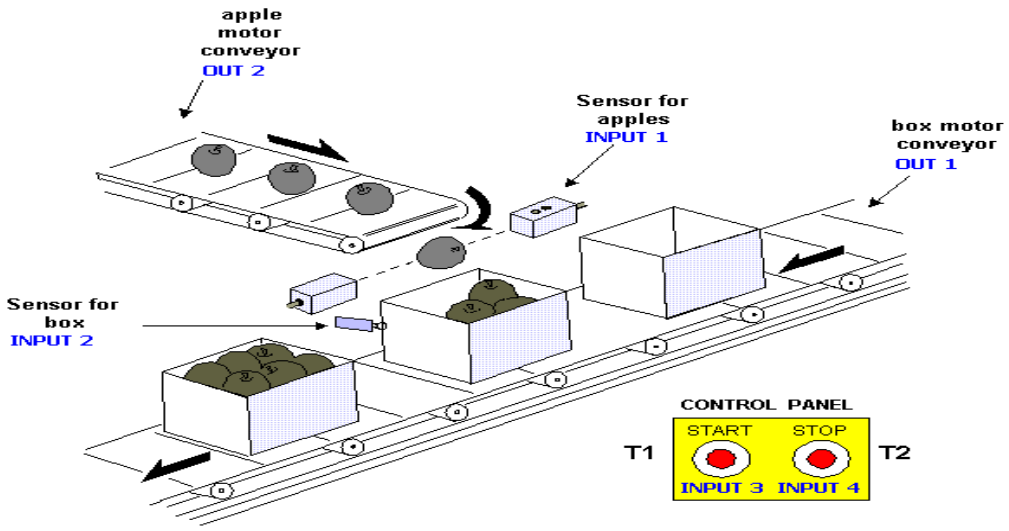
System is an organized collection of parts (subsystems) that are highly integrated to accomplish an overall cereal product which use raw material/ingredient inputs that go through certain processes to produce a product outputs which accomplish the overall desired product through different unit operation until the product is delivered to the storage area to be stored in ambient temperature.

1.2 Starting and operating the packaging system

Packaging is a coordinated system of preparing goods for transport, distribution, storage, retailing and end-use (consumer).Packaging is a means of ensuring safe delivery to the ultimate consumer in sound condition at minimum overall cost that aimed at minimizing costs of delivery while maximizing sales (profits).

Packaging is technology of enclosing or protecting products from physical, chemical, and biological hazards with active packaging being container used for preserving food products for business and to attract the customers and consumers interest.

To start the packing process clean inside packaging material with air compressor flush out air from inside and replaced within Nitrogen gas has unique chemical and physical properties that make packaging material suitable for packaging. Nitrogen gas is not reacting with prepared food materials, which can alter their aromas or flavors. It can be encountered with small machines (ex. packaging grain like food products) and large systems such as machines for packaging flour.



1.3 policy and Procedure of Packaging operation

- National standards of packaging material to pack products and return materials should be used in line with.
- Packaging materials must be stored in a clean dry warehouse, covered with no toxic drape, stacked from the wall.
- Packing room powder spilled on the ground may not be packaged.
- Establish a needle management system to prevent broken needles into the product.
- The net content of packaged products should meet the requirements of relevant state laws and regulations, the packing process should be regularly checked and make a record.
- Law states that a food product is misbranded (being sold) if the container is misleading.
- Fill with standards: for measuring and calculating "the fill" of a container
- Regulates the labeling of food product of quality" and "substandard fill."
- Respect to packaging container may cause the food to be adulterated.
- Packaging materials are considered an "indirect food additive.
- Restated improper packaging materials could cause the food product to be considered *adulterated*.

Packaging of food articles should be done in a way that chances of contamination, reaction with packed material, decomposition etc. Is avoided. The basic Packaging must be done in appropriate way or as per the norms is recommended by Food and Drug Authority. It can be done in multiple layers as enumerated as:

Primary packaging: It envelops and holds the food product that enclosed the actual commodity. It refers to the product's immediate container. Such a package remains attached to the real product until the consumers have totally used it product (e.g., a plastic packet for socks)

Secondary packaging: It is the exterior of the primary packaging that is used for its protection of a primary package. It refers to additional layers of protection that are kept till the product is ready for use, e.g., a tube of shaving cream usually comes in a card board box.

Tertiary packaging: It is the tough outer most covering that is used for bulk handling, warehouse storage and transport / shipping.

The four basic functions of a food package are:

- Containment (holding the product),
- Protection (quality, safety, freshness)
- Communication (graphics, labels)
- Convenience or utility of use.

Packaging should be:

- Designed to meet market and consumer needs
- Minimizing net environmental impact in a cost-effective way
- To minimize the use of materials and other resources without compromising product quality, safety and economic viability

The policy packaging process is divided into six stages, starting with

- The definition of goals and objectives
- The creation of an inventory of measures
- The formulation and assessment of the initial package
- The modification of the initial package through adding adjusting or removing measures
- Package implementation, and finally
- The monitoring and evaluation of the package.

1.6 Methods of packaging depend on the environmental attributes

- Vacuum packing
- Modified atmosphere packaging (MAP)
- Blister packaging or over wrapping

1.6.1 Vacuum packing

Vacuum packing is a method of packaging that removes air from the package prior to sealing. This method involves (manually or automatically) placing items in a plastic film package, removing air from inside and sealing the package.

Figure vacuum packing machine

1.6.2 Modified atmosphere packaging (MAP)

Modified atmosphere packaging (MAP) is a packaging system that involves changing the gaseous atmosphere surrounding a food product inside a pack, and employing packaging materials and formats with an appropriate level of gas barrier to maintain the changed atmosphere at an acceptable level for preservation of the food.

Food packaging in which the earth's normal atmosphere has been modified to extend a food's shelf life. A gas mix typically utilizing carbon dioxide, nitrogen, and oxygen gases. Products are packed in a single gas or a combination of three gases, depending on the spoilage mechanism of the food item. There are a number of ways to slow down these processes of spoilage and to keep food attractive and edible for as long as possible.

1.6 Labeling Requirements

The requirements that a food label must meet in international trade are defined in a series of codex standards on food labeling. This is of particular importance for those companies intending for those intending to export their products. For local markets the labels must conform to the food legislation.

General labeling requirements are:

- The name of the food
- List of ingredient
- Quantitative ingredients declaration (where indicated)
- Net contents and weights
- Name and address
- Lot identification
- Date marking and storage instructions
- Instructions for use and special storage requirement.

Self-Check – 1	Written test

Name……ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write the levels of packaging in cereal processing
2. Write the methods of packaging depend on the environmental attributes
3. Write function of packaging

Test II: fill black space

1……is a series of interrelated processes that must be coordinated and currently operated to produce the cereal product.

2…….. is a coordinated system of preparing goods for transport, distribution, storage, retailing and end-use (consumer).

3……..is a packaging system that involves changing the gaseous atmosphere surrounding a food product inside a pack

4……a method of packaging that removes air from the package prior to sealing.

Note: **Satisfactory rating - 14 points Unsatisfactory - below 14 points**

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

Information Sheet 2 - Monitoring equipment components system and Variation in operating conditions

2.1 Monitoring equipment components system

Machine monitoring is any means of connecting machine set to enables real-time production monitoring and advanced analytics of production data. A best practice of manufactures is to analyze production data to identify areas for improvement.

Several machine types are integrated into a single packaging line. Some types of packaging machine are weighing machine, filling machine, cartooning, wrapping, labeling, shrinking, sealing, tray forming, capping, cooling and drying, feeding, palletizing, picking and monitored by placing in cleaning (CIP) and clean out place (COP) and sterilizing, in addition inspection and detecting machines. The components of the machine monitored by programed logic computer. Each components explained as the following.

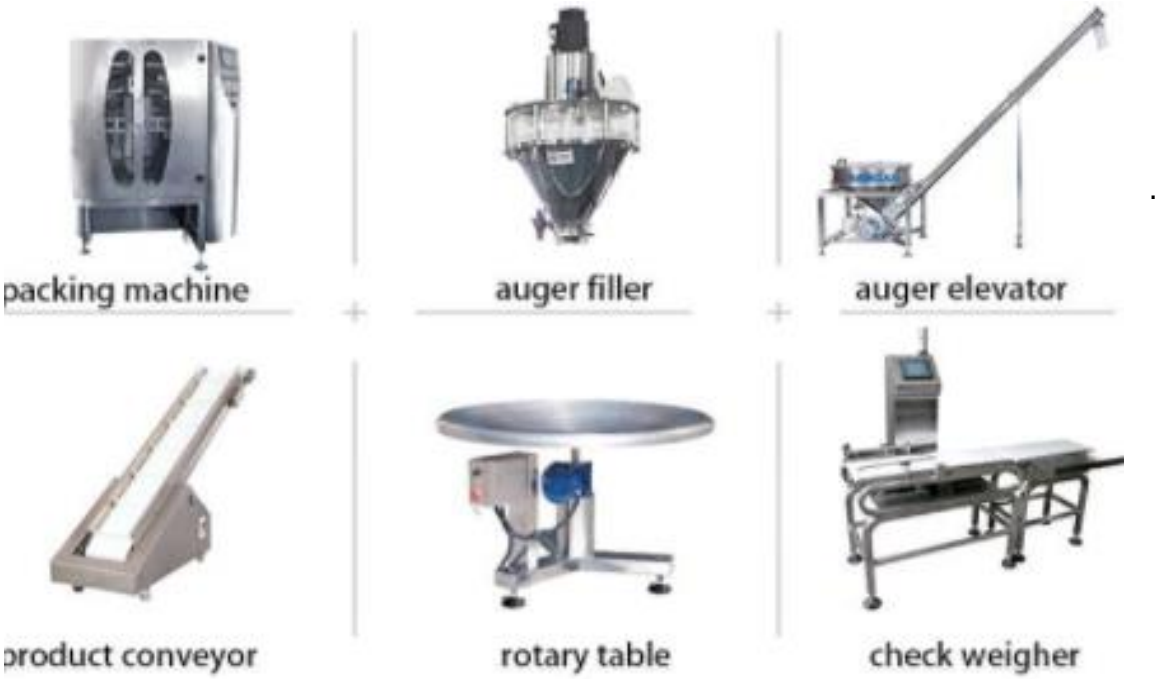


Figure packaging component

2.2 .Faulty/variation of machine component

If the environment, temperature, or humidity levels in your facility deviate from what your vertical form fill machine was specified for, this can cause malfunctions. Additionally, if you have recently changed the machine over to an untested new product or film.

The source of equipment variation

- Incoming power and main disconnect is off
- Low air pressure
    - ✓ Machine not reset
    - ✓ Safety circuit not reset
    - ✓ Incoming air pressure low
    - ✓ Low air pressure during run mode
    - ✓ Supply airline too small

- The machine does not reset
    - ✓ Safety circuit not reset
    - ✓ Low air pressure
    - ✓ Faulty wiring and bad safety relay

- The temperature out of range

The set jaw temperature does not correspond to real temperature. In this situation, you should check all wiring and connections using electrical prints. Also verify the solid-state relay light is coming on

- ✓ Sealing jaws are not warmed up
- ✓ Program Logic Computer fault
- ✓ Temperature sensor fault
- ✓ Heater fault and Faulty fuses or breakers

The above faulty leads the equipment make malfunctions must only be diagnosed and corrected by technicians who are suitably authorized or accredited (in mechanical, hydraulic or electrical work).The packaging should be on line can be filled. This will enable the pack the loaded product easily. For best results ensure cleaning and operating instructions are followed in order to maintain an adequate packaging.

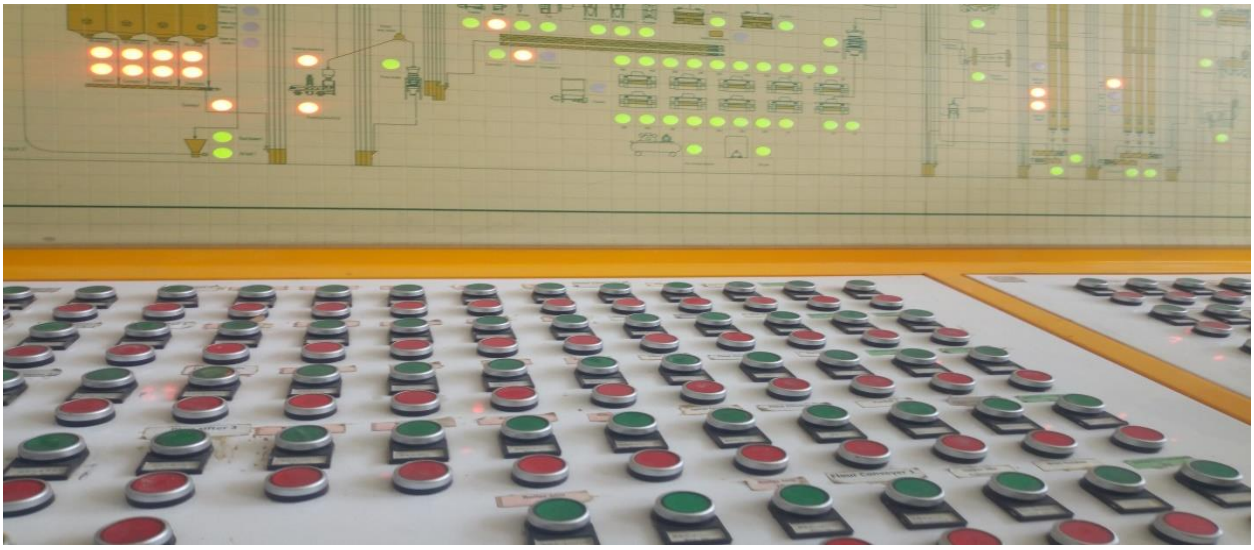


Figure Programme logic controller/computer

Filling: The filling station can adjust the number of filling heads according to the actual production speed demand. The feeding system is added to store the liquid to be filled and ensure that the liquid maintains a certain amount of stock and maintains the liquid filling accuracy. The cap tightening system can be equipped with an automatic cap feeding mechanism.

Figure filling machine

Sealing machine : bag is not heat-sealable and as the barrier properties of papers are insufficient to protect most foods for long storage periods, the seal on paper packages is

designed to simply contain the contents.

Figure Sealing machine

Automatically complete all the process from feeding, weighing to finished products output.

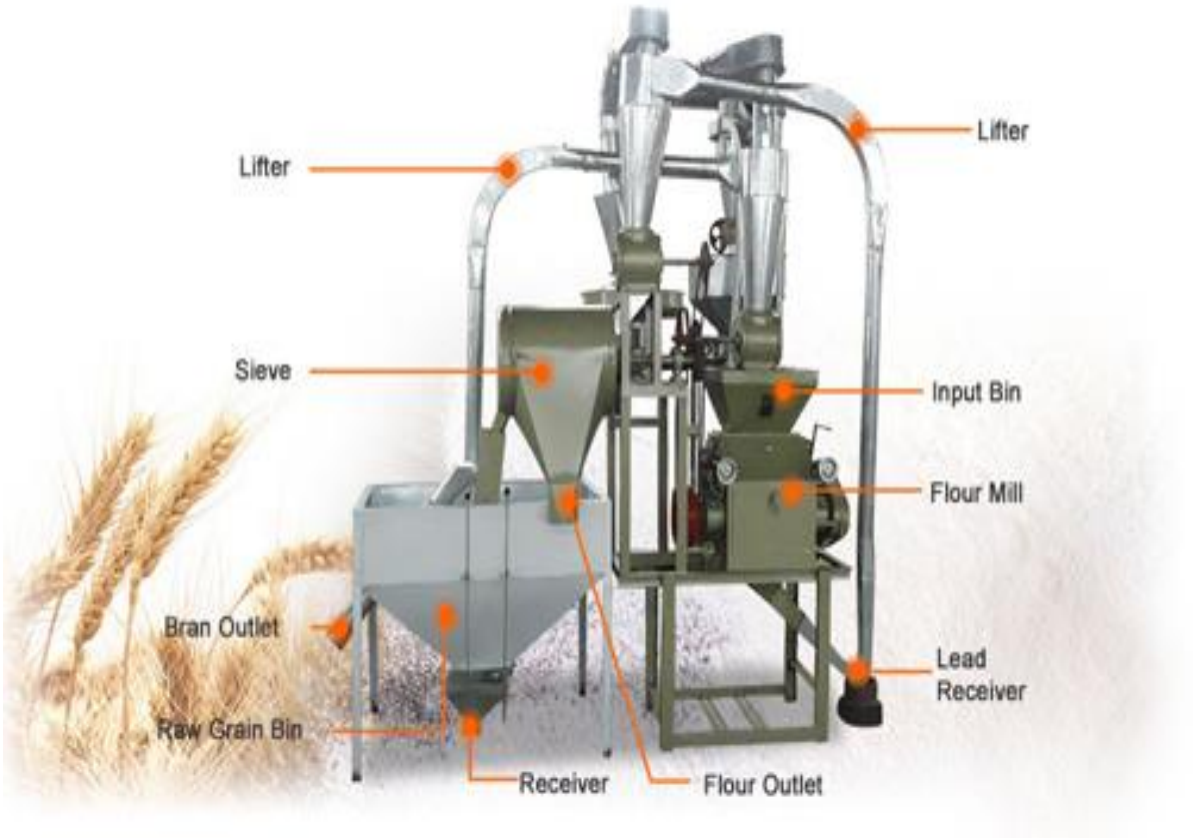


Figure: miller machine

Components of flour Sifter machine with specification

- Power and dimension - 1150beats/min, Motor power: 50W, Power supply: 110V/60Hz
- Dimensions: 35*35*35cm
- Weight machine: 8kg.
- Screen frame dimension - Screen frame: 2 layer, Screen frame diameter: 300mm, Screen frame height: 8cm.
- Application - Food industry; chemical industry; agro laboratory
- Package - 1 x Stainless Steel Electric Vibrating Sieve flour Machine.

Flour mixing machine frame/component/specification

- steel, the stainless steel bowl, spiral
- Double-motors is powerful, two- speeds rotating.
- Breaking column with foot for kneading well-hydrated dough mixtures (with more than 60% hydration).
- Bowl, spiral hook with one more bend, and the bowl guard are made from high quality stainless steel.
- The rotating spiral hook and bowl will stop when safety guard is lifted up to 30 angle for safe

Figure: Electric dough Mixer machine

Dough divider is suitable for most common types of dough as well as sensitive doughs. This dough divider contains a piston based system that divides dough into a predetermined weight range which gives perfect outcome.

Figure: Dough divider

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is machine monitoring
2. What is monitoring parameters
3. How to maintain faulty/variation of machine in operation
4. Explain the component of flour milling machine
5. Write the components of four sifter
6. Explain component of dough mixer

Note: **Satisfactory rating - 12 points** **Unsatisfactory - below 10 point**

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

Information Sheet 3- Troubleshooting procedures and problem Solving techniques

3.1 Problem solving techniques

Troubleshooting is a form of problem solving, often applied to repair failed products or processes on a machine or a system. The problem is initially described as symptoms of malfunction, and troubleshooting is the process of determining and remedying the causes of these symptoms.

3.2 Troubleshooting procedures

Before begin to operate your machine you should be check the following things:

- Make sure the machine has been powered on for at least 20 - 30 minutes before engaging the heat seal bar.
- Make sure the heater temperature is within the specified range.
- Ensure that the product and bag loading areas are free of obstructions and malfunctions.
- Making sure that all switches are functioning normally.

Packaging machine troubleshooting

- Sealer temperature incorrect. If temperature is too low, seals will be weak or not made at all. If excessive, the seals will blister and discolor and on machines utilizing wheel sealers, web may stick to wheels.
- Excessive fin wheel pressure - seal shows roughness and extreme sealed area has small holes.
- Insufficient fin wheel pressure - seal is weak and shows a light pattern from the wheel surfaces.
- Faulty bearing in sealer wheel – seal is intermittent; strong to weak.
- Uneven pressure on upper jaw. Seals weak and show light serrations on one end while the opposing end is satisfactory or may show damage.

- Roll (wrapping material) nicked or damaged. Un winding from roll or the break may occur in area of the machine where power greater.

During machine operation:

Weather your fill and seal machine is operating, check the following things:

- Make sure the bags are feeding properly into the machine and that there is an adequate supply.
- Make sure the printer, sealing bar, and components are functioning properly.
- Watch the screen for error messages

3.4 Problem solving techniques

- Balance top and bottom pressure with adjusting screws.
- Check temperature and adjust difference to 10° F or less.
- Replace faulty bearing. This should be done by a qualified /skillful operator

The overall packaging production costs are impacted by three major elements:

- Quality
- Productivity and costs.

These three factors are all very important and they should not be seen in isolation but across the entire chain from designing to printing to converting and to packing

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. What is Troubleshooting
2. Write Problem solving techniques
3. Write Troubleshooting procedures

Note: Satisfactory rating – 6 points Unsatisfactory – below6 points
You can ask you teacher for the copy of the correct answers.

Information Sheet 4- identifying variation in equipment operation and reporting maintenance requirement

4.1 Variations in equipment operation

Variation of equipment is happen in packaging machine during the operation and monitoring. These variation are occurred in an assessment of technical capabilities, labor requirements, worker safety, maintainability, serviceability, reliability, ability to integrate into the packaging line, floors pace, flexibility (change-over, materials, multiple products), energy requirements, quality of outgoing packages, qualifications (for food, pharmaceuticals, etc.), throughput, efficiency, productivity, ergonomics, return on investment, etc.

Packaging machinery can be:

- purchased as standard, off-the-shelf equipment
- purchased custom-made or custom-tailored to specific operations
- purchased refurbished and upgraded
- manufactured or modified by in-house engineers and maintenance staff

Double chamber vacuum packer

In addition to purchasing equipment, leasing options are often attractive.

Machinery must be compatible with the expected operating conditions. For example, cold temperature operations require special considerations. Some industries must perform periodic wash downs of all equipment. This high pressure chemical washing puts special demands on machinery and control systems. Condensation within closed portions of machinery can also be problematic.

Machinery needs to keep control of the product being packaged. For example, powders need to be stable; liquids cannot slosh out, etc.

Some manufacturers decide not to do their own packaging but to employ contract packagers to perform all or some operations. Capital, labor, and other costs are outsourced.

4.2 Workplace procedure

A procedure explains a specific action plan for carrying out a policy.

Procedures tells employees how to deal with a situation and when. Using policies and procedures together gives employees a well-rounded view of their workplace. Workplace safety procedures are standardized processes that outline how to conduct tasks with minimal risk to people, materials, and work environments. The procedures include work-related tasks that address safety concerns, safety equipment, and work-area precautions.

4.3 Reporting maintenance requirement

Maintenance report is one of the main tools used by maintenance inspections on the equipment.

If the equipment or machine face with problem/emergence shut the system of production and packaging then identify the faulty of equipment and prepare requirement for maintenance for repairing the machine that ready for function. This requirement cost, labour, resource, electric power, and landscape

First to maintain the equipment use the format of maintenance report then records the maintained types.

Monthly Electrical Maintenance Report

Format No. *Rev. No.* *Rev. Date.*

Request No.	Request Date	Requested by	Req. Department	Received by	Work Order No. & Date

System Failure Registered	System ID & Name

Maintenance Checklist

Sr. No.	Description	Status	Comment / Suggestion

Remarks

Installed / Repaired Spare parts	Required Actions

Checked by: Date:

Reviewed by: Date:

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. What is maintenance report
2. What is maintenance requirement
3. Write maintenance resource

Note: **Satisfactory rating – 6 points Unsatisfactory - below 6 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 5: Monitoring the production and packaging systems to confirm specification.

5.1 Monitoring the production systems

A production monitoring system is a process that is designed to record the overall performance of the production line in real time. The system collects data from the various sections of the production line and is relayed to employees and managers working on the line.

During cereal processing, by-products are differ in their physical state are aspired by an air-trap aspiration system and trapped in the aeration to be reduced at each stage in the food value chain and monitoring food waste.

To confirm the products of cereal like wheat flour and maize flour you should consider the following specification:

- extraction rates that leaves negligible amounts of bran
- white wheat flour obtained by milling high protein wheat intended for bread making
- wheat flour obtained by milling the entire wheat grain to fine particle size without any separation
- white flour produced from endosperm
- No aspiration and ash character

The wheat grain from which the flour is obtained shall be of sound quality, free from sand, have characteristic odour and flavour complying with the relevant East African Standards.

Table 1 — Specific requirements

Types of flour	Moisture content, max. %, m/m	Fibre content, max. %, m/m	Total ash content, max. %, m/m	Residue on sieving through 180 micron-sieve, max. %	Protein content, min. %, m/m	Mixture of acid-ingredients and sodium bicarbonate added, max. %, m/m	Total aflatoxin	Aflatoxin B1 only, ppb max	Fumonisin
White wheat flour:							10	5	2
Baker's flour	13	1.0	0.70	0.80	11.0	–			
Home baking flour	13	1.0	0.70	0.80	9.0	–			
Biscuit flour	13	1.0	0.55	0.50	8.0	–			
Cracker flour	13	1.0	0.70	0.50	8.0	–			
Self-raising flour	13	1.0	2.0	0.80	8.0	4.5			
Standard flour	13	1.5	1.10	30.0	11.0	–			
Atta flour	13	2.0	2.0	55.0	12.0	–			
Whole-meal flour	13	2.0	2.0	30.0	12.0	–			
Test methods	ISO 6540	ISO 5498	ISO 2171		ISO 1871		ISO 16050		

5.2 Monitoring the packaging systems

Take full control of equipment performance and food product quality in your filling and packaging operation with Programmed computer Centre, our packaging line monitoring system. The production of flour and flour product like macaron is a value chain that requires constant monitoring to ensure food safety, consistent quality, high throughput and minimized operating cost. In your filling and packaging line, you need to be able to manage all the data in correct parameter in order to assure top performance of work.

In the packaging system the operator should be control the pipeline and the valves in order to:

- Reduce human error with fact-based decisions

- Ensure consistent operating procedures with reliable information and data management
- Reduce man-hours required – less time for calculations and data analysis
- Reduce waste and off-spec with greater precision and repeatability
- Cut downtime with more timely actions and targeted maintenance
- Increase OEE (overall equipment effectiveness) with optimized line and equipment utilization

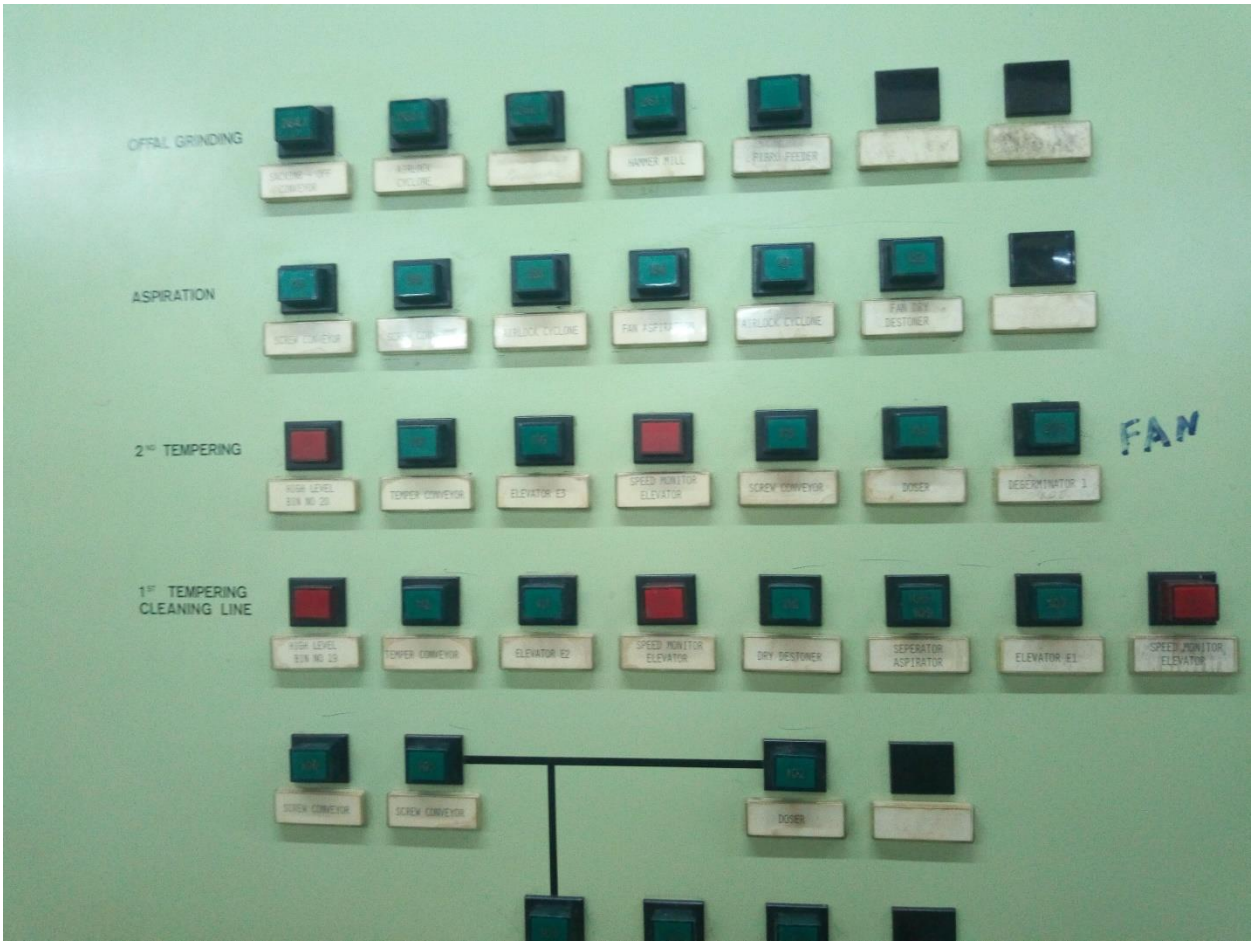


Figure Programmed control of flour production

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. What is monitoring
2. What is the role of operator in packaging and production?
3. By what specification you have to confirm the cereal and cereal products

Note: **Satisfactory rating – 6 points Unsatisfactory - below 6 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 6- Identifying, rectifying and reporting product/process out of specification

6.1 Out of specification out comes

The term out of specifications, are defined as those results of in process or finished product testing, which falling out of specified limits. The out of specifications (OOS), may arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When Out of specification Out Specification has arrived, a root cause analysis has to be performed to investigate the cause. The reasons for OOS can be classified as assignable and non-assignable.

When the limits are not in specified limits, it is called out of specifications. When OOS has occurred, the analyst should inform to quality control (QC) manager. Each OOS will be identified with a unique identification number. The out of specifications investigation involves 2 phases:

5.1.1 Phase I Investigation - Laboratory

The purpose of the laboratory investigation is to identify the cause for out of specification result. The reason for the out of specification may be defect in measurement process or manufacturing process. Irrespective of the rejection of batches, the out of specification results must investigate for their trend. The investigation can be done to only those batches that are resulted in standard operation procedure. The out of specification investigation should be thorough, timely, unbiased, well documented and scientifically sound.

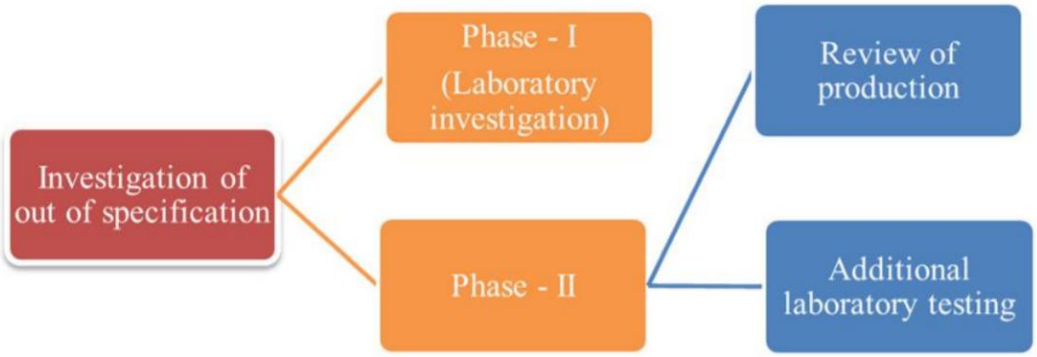


Figure1. Investigation of out of specification result

5.1.2 Phase II investigation

When there is no possible outcome has obtained from the phase I investigation, the phase II investigation should be commenced in context to investigate the errors occurred in manufacturing processes, sampling procedures along with other additional laboratory testing.

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Note: **Satisfactory rating – 20 points Unsatisfactory - below 20 points**
You can ask you teacher for the copy of the correct answers.

Maintaining is keeping the working area where housekeeping is cleaning floors and surfaces, removing dust, and organizing kaizen.

6.1 Type of Workplace

The workplace may be permanently fixed or even temporary based on one work.(Activities), seasonal work types, work involving one of situation with different duration (hours, days or weeks).

6.2 Access

Access should be given to the ability of a person to access the facilities that one facility or availability should be safe and accessible for all persons who require access.

6.3 Maintenance

The work environment, facilities and availability are required to be maintained in a safe and healthy condition that need to be hygienic, secure and in a serviceable condition. This includes replenishment of consumables, repair of broken or damaged furnishings and equipment and ensuing cleanliness of these areas.

6.4 Work Layout

The layout of the workplace is required to allow persons to enter and exit the workplace and move within safely, both under normal work conditions and an emergency.

6.4.1 Entry and Exit

Entries and exits are required to be safe to allow impeded access and outlet for all workers, trainees, visitors and those with special needs.

In particular:

- Entries and exits should be slippery resistant under wet and dry conditions
- Any walkways, boundaries or pathways shall be marked with standard wide with a contrasting color e.g. white or yellow
- Handrail should be provided on or at least one side of every staircase

- Separate entry and exits for equipment e.g. forklifts or trucks, and pedestrians are to be provided
- Power operated doors and gates should have safety features to prevent people from being stuck or trapped.
- Location of exits should be clearly marked and signs posted to show direction of exit doors to aid emergency evacuation.

6.5 Work Areas

The layout of the work area should be designed to provide sufficient clear space between machines, fixtures and fittings to workers can move freely without strain or injury also evacuate quickly in case of an emergency.

In determining how much space is required, the following should be considered:

- The physical actions needed to perform the task
- The need to move around while working
- Whether the task is to be performed from standing position
- The equipment to be handled and the personal protective equipment may be worn to perform the work.

6.5.1 Floors and Other Surfaces

Floor surfaces shall be suitable for the work area and be chosen based on the type of work being carried out at the workplace, as well as the materials used during the work process. **In general:**

- Floors shall be free from hazards e.g. cables, uneven edges, broken surfaces
- Floor surfaces shall have sufficient grip to prevent slipping, especially in areas that contaminated
- Floors should be strong enough to support loads placed on them.

6.5.2 Workstations

Workstations should be designed for workers comfortable undertaking their task and allow for a combination of sit and standing tasks.

- Allows adequate space for leg clearance and freedom of movement
- fully adjustable to accommodate different size workers (e.g. seat height, back rest height and back rest adjustments)

- Chairs shall be fitted with castors for carpeted surfaces and glides or braked castors on hard surfaces.

6.5.3 Lighting

Sufficient lighting is required to allow safe movement around the workplace and to allow workers to perform their job without having to adopt required postures or strain.

Emergency lighting is to be provided for the safe evacuation of people in the event of an emergency.

6.5.4 Air Quality

Workplace are to be adequately ventilated which includes provide fresh and clean air drawn from outside to the workplace. Workplace inside buildings may have natural ventilation, mechanical ventilation or air conditioning.

An air-conditioning system should be:

- Provide a comfortable environment in relation to air temperature, humidity and air movement
- Prevent the excessive accumulation of odours.
- Reduce the levels of respiratory by-products, especially carbon dioxide, and other indoor contaminants that may arise from work activities
- Supply an amount of fresh air to the workplace, exhaust some of the stale air as well as filter and recirculate some of the indoor air.

6.5.5 Heat and Cold

Managing health and safety risks associated to hot and cold environments

6.5.6 Welfare Facilities

Workers are to be provided with:

- Adequate breaks to use the facilities,
- Facilities which are within a reasonable distance from the work area,
- Shift workers have similar access to those who work during the day, and
- A means of access which is safe.

Self-Check – 7	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test I: Short Answer Questions (3 points each)

1. Write some of good housekeeping indicators?
2. Describe house keeping records and importance?
3. Describe the characteristics of poor house keeping records?

Note: **Satisfactory rating – 6 points Unsatisfactory - below 6 points**

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

Information Sheet 8- Conducting work with workplace environmental guidelines

8.1 Conducting work with workplace environmental guidelines

The purpose of food packaging is to contain food in a cost-effective way that satisfies industry requirements and consumer desires, maintains food safety and minimizes environmental impact. When conducting the packaging process consider the environmental factors. Atmospheric packaging limits the packing.

Modified atmosphere packaging (MAP) is a packaging system that involves changing the gaseous atmosphere surrounding a food product inside a pack, and employing packaging materials and formats with an appropriate level of gas barrier to maintain the changed atmosphere at an acceptable level for preservation of the food.

Store all refined **flours** in a cool, dry place protected from sunlight.

8.2 Legislative Requirements

A person conducting a business or undertaking at a workplace must ensure so far as is reasonably practicable, the following:

The layout of the workplace: should allow persons to **enter, exit** and move without health and safety risk, both under normal working and emergency conditions,

Work areas: space for work to be carried out without risk to health and safety,

Floors and other surfaces: are designed, installed and maintained to allow work to be carried out without health and safety risk,

Lighting enables:

- ✓ Each worker to carry out work without risk to health and safety, and
- ✓ Persons to move within the workplace without risk to health and safety, and
- ✓ Safe evacuation in an emergency,

Ventilation: enables workers to carry out work without risk to health and safety,

Workers carrying out work in extremes of **heat or cold** are able to carry out work without risk to health and safety,

- Work in relation to or near essential services does not give rise to a risk to the health and safety of persons at the workplace.

Ethiopian food standard code follows requirements notified in structured format regulations or legislation for:

- Food and drug authority
- Occupational health safety environmental management
- Food standards and additives
- Weights and measures
- packaging & labelling
- Contaminants & toxins
- Prohibitions and restrictions
- laboratory sampling and analysis

Self-Check – 8	Written test

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. What is legislative requirement?
2. Describe the work place requirements?

Note: **Satisfactory rating – 10 points Unsatisfactory – below 10 points**

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

Operation sheet-1 techniques start up and operate the system

Procedure 1: techniques to operate packaging process

Step 1: Place empty bag loops over the support arms or bag support hooks.

Step 2: Attach the bag liner over the inflatable neck seal.

Step 3: Adjust the height of the bag support arms

Step 4: Inflate the neck seal to secure the bag liner.

Step 5: Inflate the bag or liner with air (or there is an added nitrogen option)

Step 6: Commence filling by weight or volume.

Step 7: Apply vibration (if required).

Step 8: Fill with target weight or volume, deflate the neck seal and tie the bag liner closed.

Step 9: Engage the automatic loop release

Step 10: Remove the filled bulk bag by forklift, pallet jack or roller conveyor

Operation Sheet 2 - Techniques of problem solving

Procedure 2.problem solving techniques

Step1.identify the happen problem

Step2.apply techniques of solving the problem

Step3.make to ensure/sure the problem

Step4.taking the action

Step5.replace the faulty bearing

Operation Sheet 3 - procedures of housekeeping standard

2.1 Wear appropriate personal protective equipment's **(**PPE**),**glove, eye glass, safety shoe, gown and hair net

2.2 procedures of housekeeping standard

Step 1: Arrange the working area house

Step 2: Change the landscape in work areas, walkways, inlet and exits.

Step 3: Keep floors and work areas clean, dry, and grease-free.

Step 4: Keep steps and ladders in serviceable condition.

Step 5: Keep emergency equipment clean and unobstructed.

Step 6: Ensure that all signs and caution labels are in good condition and visible**.**

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1**hour.

Task1. Perform packaging operation system

Task2. Applying maintaining the work area with housekeeping standards

Task3. Apply Problem solving techniques

LG #33	LO 4: Monitor the preparation of by-product storage area

Instruction sheet

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

- Cleaning storage site of weeds, dust and spillage
- Maintaining site in a clean and tidy condition
- Checking and monitoring storage types in the categories or groups of products/stock
- Preparing storage site with OHS standards

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Clean storage site of weeds, dust and spillage
- Maintain site in a clean and tidy condition
- Check and monitor storage types in the categories or groups of products/stock
- Prepare storage site with OHS standards

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
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1- Cleaning storage site of weeds, dust and spillage

1.1 Introduction

Cleaning is the removal of impurity/byproduct of cereal or waste of from the site or area of storage for cleans the place and safe for cereal storage. There cereal waste and byproducts, such as weeds, dust and spillage and germ and bran which are impurities mixed with the grain mass is eliminated. This operation should be accompanied by a sorting of the products according to quality standard before storage, marketing or further processing of the products.

Grain weeds is the leaf of the grain remain in cereal that transported from the farm field. Grain dust is a complex mixture of husk particles, cellulose hairs and spikes, starch granules, spores of fungi, insect debris, pollens, rat hair and mineral particles.

1.2 Cleaning storage site of weeds, dust and spillage

After threshing grains you have to clean contaminate or impurities (small pebbles, shell, weed and spillage plant remove as a waste. Before unloading the cereal and its products to the site you have to clean the storage area. These impurities lower the quality of final product. The impurity is make costly, waste time, effort and money on drying the impurities along with the grain storage.

The simplest cleaning method, known as winnowing, consists of tossing the grain into the air and letting the wind carry off the lightest impurities but does not eliminate the heavier impurities (gravel, foreign grains, earth, etc.).

Step of cleaning process emptying the trash; high dusting; sanitizing and spot cleaning; restocking supplies; cleaning the bathrooms; mopping the floors; and hand hygiene and inspection. Remove liners and reline all waste containers

Suitable storage site of cereal and its products should be a dry place, air tight containers, airtight free plastic containers and deep freezer.

1.3 Cleaning devices

Cleaning devices is a large class of implements used for cleaning. You have to make desired cereal and its product form impurities for suitable for a long-term storage, appropriate cleaning devices must be used, such as: winnowers, pre-cleaners and cleaner-separators.

Winnowers: these machines significantly contribute to improving product quality and marketing, especially in production areas. Sometimes operated by hand but motorized, winnowers are simple machines that consist mainly of a hopper to receive the grain, a fan and a set of sieves.

Figure1.winnowing machine

Pre-cleaners: used to pre-clean grain moist, before it goes to the artificial drying machine.

There are several models of pre-cleaner:

- The circular pre-cleaner eliminated impurities
- The drum pre-cleaner eliminated heaviest impurities passing through the meshes of a drum, and the lightest are eliminated by suction the clodder.

Cleaner-separators: separate large output of grain and storage center or site and consist mainly of a reception hopper, a fan and set of vibrating sieves which clean grain by repeated suction of the lightest impurities, followed by siftings of the grain.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. What are weeds in grain?
2. What is spillage in grain?
3. What is dust in grain storage?
4. Write the important cleaning device

Test II: Choice

1. Which one of the following is suitable for storage site of cereal

   A. Store in a dry place
   B. Protect from insects
   C. Air tight containers.
   D. Airtight free plastic containers
   E.all

2. Which of the following cleaning device use fan and a set of sieves?

   A. Winnowers
   B. Pre-cleaners
   C. Cleaner-separators
   D. Destoner

Note: **Satisfactory rating – 20 points Unsatisfactory - below 20 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 2- Maintaining site in a clean and tidy condition

2.1 Maintaining site in a clean and tidy condition

Maintaining site is keeping/controlling grain in serviceable and water tight condition. Inspect the storage area and repair any damage or faults of equipment to maintain the cereal and its products but if water penetrate from drainage will activate the living components of the grain mass.

General requirement maintaining site is taking modern cleaning and tidy action to maintain storage areas. Storing stocks in storage areas keeping stores well extinguished and ventilated. Keeping shelves and maintaining equipment in good order.
Grain quality will not improve during storage. At best, initial quality can only be maintained.
To assure that the only high quality grain goes into storage, the following is recommended:

- Clean around the storage site. Remove any byproducts like old grain, germ, bran, weeds, and other debris.
- Remove all traces of old grain from the storage site like bran and fine particles
- Properly adjust the combine (harvesting, threshing and handling equipment) to minimize grain damage.
- Clean the grain using preferable a rotating grain cleaner and put into the storage.
- Cool the grain to the prevailing outside air temperature as soon as it is put into the storage.

Storage: you have to maintain the quality of grain for storage with type of grain, duration of storage, value of grain,Climate ,Transport system, cost and availability of labour ,Cost and availability of bags, Incidents of rodents and certain types of insects

There Two methods of grain storage

i. Bag Storage

There are several ways of storing grain in bags. The bags of grain can be stacked out-of-doors under placed inside storehouses, warehouses that stored in bags and refrigerated warehouses.

The grain should be cooled the average outdoor temperature is 10^0C to 15 ^{0} C cooler than the grain. It should be cooled to near or below 30 ^{0}C for winter storage

II. Loose in bulk storage

You should have to store cereal in silos and controlling moisture content and temperature. This method is used over a long period of time requires an accurate control of the temperature and the moisture content of the product.

Storage of moist grains (14–18% moisture content) in hermetic bags may pose health risk due to grain discoloration caused by fungal growth that produces mycotoxins if the grains enter the food chain.

Wheat moisture content at harvest is between 18% and 20%. This is above the ideal wheat moisture content for stored wheat. It should be to bring the moisture content down to **13.5%** if you plan to sell for the best selling price.

Moisture and temperature

The most influential factors in the storage of grains are moisture and temperature. Higher temperature will affect the ability of the stored seeds to germinate over time, but food value is only slightly reduced. Freezing temperatures will not damage stored grains or pulses.

Acceptable level of moisture:

- 5% to 12% considered optimal.
- Up to 17% generally considered moderate **moisture** and **acceptable**.
- 17% dry to down to 12% best moisture

The retention of grain quality requires understanding the role of two major factors:

i. low temperature of storage and
ii. Low moisture content grain.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test II black space

1…….keeping/controlling grain in serviceable and water tight condition.

2. Write factors of storing grain with their ranges

a……

b…….

3.At what temperature and moisture content the grain is best to store for good grain quality

4.write methods of grain storage

Note: **Satisfactory rating – 10 points Unsatisfactory - below 10 points**

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

Information Sheet 3- Checking and monitoring storage types in the categories or groups of products/stock

3.1 Checking and monitoring storage types in the categories or groups of products/stock

Grain storage principles

The retention of grain quality requires understanding the role of two major factors:

i. Low temperature of storage.
ii. Low moisture content grain.

High temperature and high moisture are the most significant factors affecting grain quality in storage. Each can cause rapid decline in germination, malting quality, baking quality, color, oil composition, and many other quality characteristics should be affected.

High temperatures and moistures favor development of insects and molds. Development of insects is limited by temperatures below 15°C, and by moistures below 9% in cereal grains. Development of molds is limited by temperatures below 10°C, and by moistures below 13% in cereal grains.

Spraying with insecticides or fumigating minimizes insect problems but leaves chemical residues in grain which break down with time. Presence of residues and their concentration, affects acceptability of the grain to markets. Some markets prefer grain without residues. Grain buyers will not knowingly accept grain treated at rates higher than those specified on the label, or within the specified with holding period.

Four factors which greatly affect grain storability are:

i. Grain moisture content
ii. grain temperature
iii. initial condition of the grain
iv. insects and molds

Moisture content

If grain moisture content is too high, the best aeration equipment and monitoring management will not keep the grain from spoiling. All micro-organisms, including molds, require moisture to survive and multiply.

Some areas and conditions to check when monitoring grain quality include:

- Grain surface for condensation, crusting, wet areas, molds, and insects.
- Storage roof for condensation and leaks.
- Grain mass for non-uniform temperatures, high moisture layers, molds,insects.
- Exhaust air for any off-odors.

3.2 Storage types of products/stock

Rack refrigeration/freezers/cold rooms:

Consists of multiple compressors piped together connected to multiple refrigerated the cereals and its products. It allows the use of multiple compressors and condenser fans for cooling more efficiently, conveniently and compactly as compared to traditional individual refrigeration systems

For safety, it is important to verify the temperature of the refrigerator. Refrigerators should be set to maintain a temperature of 40 °F (4 °C) or below. Some refrigerators have built-in thermometers to measure their internal temperature.

Marked floor space

Floor marking is the process of using visual cues such as lines, shapes, and signs on floors to make a space easier for people to navigate. These cues divide spaces, highlight hazards, outline workstations and storage locations, direct traffic, and convey important safety or instructional information.

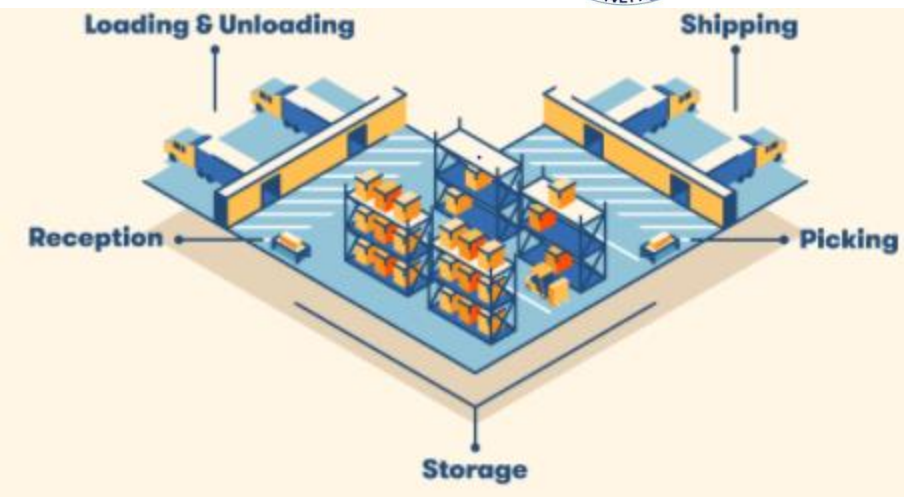


Figure1. Marked floor space

Warehouse Racking and Pallet Rack Systems

You can reduce clutter, maximize your warehouse space, and increase worker productivity by investing in a warehouse pallet racking system. Pallet racking systems can solve a number of warehouse storage issues, including:

- Getting pallets organized and up and off of the floor
- Maximizing your existing warehouse space
- Simplifying the loading and picking of pallets or cartons
- Improving worker efficiency and automating some of the labor required to store and retrieve

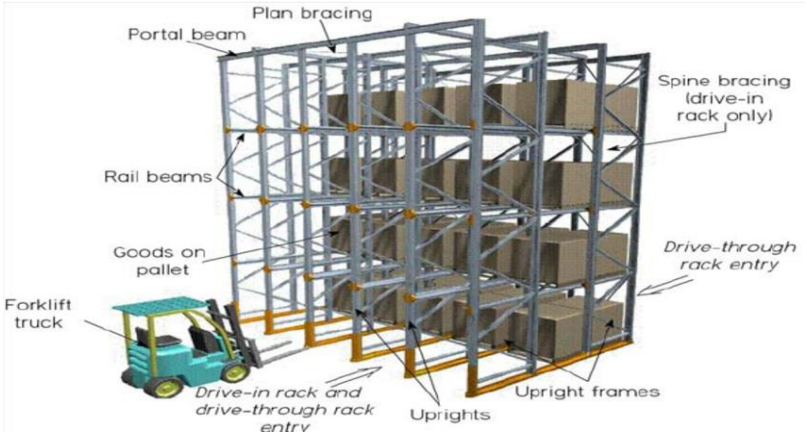


Figure 2.Racking system

Grains are usually preserved as bulk stack in horizontal stores

i. Bulk Storage

Grains can be stored and preserved as bulk in both vertical and horizontal warehouses; the surface of bulk stack cereals (wheat, barley, rye, oat, corn, chickpea and lentil) is leveled properly. It is possible to store more grain on unit area.

Cereal facilitates the control of grain samples easily. Sampling the grain from store check the moisture content as it is in standard 12% at ambient temperature 25 ^{0}C and for the flour and products you should consider as moisture content best at 14%

Figure Bag storage

ii. **Storage Underground**

Underground pits are claimed to keep grain without damage for many years. The pits keep grain cool, and airtight. Grain on top and around the sides can be mouldy. This technique provides the grain not to contact with air, i.e., oxygen (O2) during storage period. However, the weather conditions and the position of ground should be not being any damage on cereals.

iii. **Storage in bag**

The moisture content of cereal is the critical factor on this technique. If the moisture content in cereal is increased it is difficult to control the products as they are in bags. Besides, less amount of cereals are stored on unit area when compared to the bulk storage technique.

iv. **Storage in Warehouse**

For the storage in warehouse, the determination of location, control of moisture content and supplement of sufficient aeration of cereals are important factors

The cereal and cereal products could be stored as bulk stack and also in sacks in this technique. The damage from insects is the most common problem in warehouses

v. Storage in Silo

The most preferred storage technique in plants is to store the grain in silos. It has many advantages due to less labour cost and less time-consuming depending on easy discharge and conveying of cereals and keeping hygienic conditions during these processes.

Figure grain silos

Vi. Refrigerated storage

The main objective of refrigerated aeration in the time to achieve temperatures of less than 18 °c to reduce insect activity.

There are two types of storage based on duration:

Temporary storage:

- Aerial storage
- Storage on the ground, or on drying floors.
- Open timber platforms.

Permanent storage

- Storage baskets (cribs) made exclusively of plant materials. ...
- Calabashes, gourds, earthenware pots. ...
- Jars

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test I: Short answer questions

1. Write the methods of storage grain quality
2. Write the methods of storage depend of duration

Test II: Choice

1.Which of the following factors greatly affect grain storability?

A. Grain moisture content
B. grain temperature
C. initial condition of the grain
D. insects and molds E. all

2.Which of the following area and condition is monitoring grain quality of storage?

A. Grain surface for condensation, crusting
B. Storage roof for condensation and leaks.
C. Grain mass for non-uniform temperatures.
D. Exhaust air for any off-odors.
E. .all

3. Which of the following is preferred as modern grain storage?

A. bulk storage
B. storage in bags
C. storage in sheds
D. Storage in silos.

Note: **Satisfactory rating – 10 points Unsatisfactory - below 10 points**

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

Information Sheet 4- Preparing storage site with OHS standards

4.1 Preparing storage site with OHS standards

Storage Hazardous materials must be separated from incompatible materials and must be provided with proper secondary containment. Stores or handles hazardous materials are required to do routine, documented self-inspections of the storage areas.

4.2 Occupational health and safety (OHS) standards

Mandate reduction, removal or replacement of job site hazards. **OHS** programs also help minimize the effects of hazards. Company management and employers are obliged to provide a safe working environment for all of the employees.

You must identify the hazards where you are working and decide how dangerous they are. Eliminate the hazard or modify the risk that it presents.

The most common serious and life-threatening hazards include:

- Fires and explosions from grain dust accumulation
- Suffocation from engulfment and entrapment in grain bins
- Falls from heights and crushing injuries
- Amputations from grain handling equipment.

Food safety: mycotoxins associated with high moisture content of stored grains was one of the emerging food safety issues raised at a recent international conference on grain protection

There are many risks associated with the safety of grains and its products such as:

- Chemical residues of field
- Storage fungi
- Mycotoxin
- Rodents and pests

This risk occurred during poor storage, Accumulations of bulk items, transportation and processing facilities and hazards associated with processing.

Storage risks of packaging caused by:

- Poor manual-handling risks, eg putting bulky items above head height.
- Spillages of goods causing environmental damage or increasing the risk of slips
- Exposure to badly stored hazardous substances.
- shelf life of stored grains is increased by cooling and aerating in silos
- Barley and malt should be stored in a dry and cool environment to avoid the potential risks

Storage Controls parameters are:

- by controlling moisture content and temperature at 9-14% and 10^0 C to 30^0 c
- Mold growth is restricted and grain can be maintaining their quality.

4.3 Occupational Health and Safety (OHS)

Occupational health and safety (OHS) relates to health, safety, and welfare issues in the workplace. OHS based on the laws, standards, and programs that are aimed at making the workplace better for workers, co-workers, family members, customers and other stakeholders. Example emergency procedures, location of aid stations, health and safety responsibilities, reporting of injuries, unsafe conditions and acts, use of personal protective equipment, right to refuse hazardous work.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test I: Short answer questions

1. Explain what is Occupational Health and Safety (OHS) in grain storage
2. Write and explain the major grain storage control
3. What is food safety

Test II: Choice

1. Which of the following is not considered as hazard threatening
   A. fires and explosions from grain dust accumulation
   B. suffocation from engulfment and entrapment in grain bins
   C. falls from heights and crushing injuries
   D. Lack grain handling facility equipment.
2. Which one of the following is not risk factor of grain storage?
   A. Chemical facility in storage
   B. storage fungi
   C. Mycotoxin
   D. Rodents
   E. Pests

Note: **Satisfactory rating – 10 points Unsatisfactory - below 10 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 5- Ensure and maintain by product storage area

5.1 Ensure and maintain *by product* storage area

Byproducts are stored separately from the products without cross contamination and mixed with products. In any food process, the pipeline of product and byproduct has different line and discharge of the waste and product outlet. So the byproduct storage area must be identified from product usable for other purpose. Storage area should be tidy and clean for both product and byproduct but separately storage as their use.

Cereal by-products arise from dry milling (to produce flour), wet milling (for starch and glucose production) and aeration, conditioning. The nature of the byproducts is influenced by the particular cereal concerned and the exact conditions of processing. Example the outer shell, bran, germ of the maize is frequently removed during dry milling.

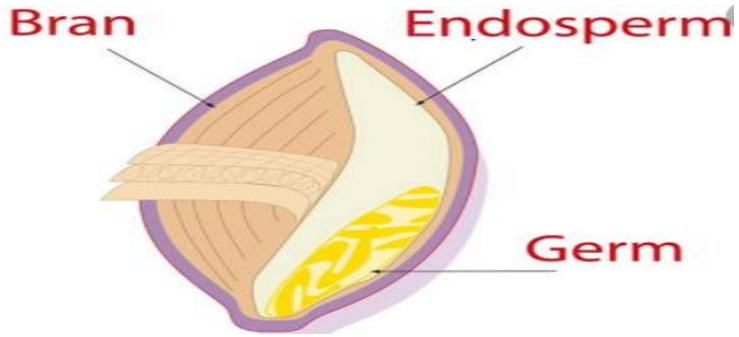
The main of byproducts wheat milling industries

a. germ
b. bran

This byproduct have been recognized as a outstanding sources of protein, dietary fiber, trace minerals, antioxidants, phytonutrients' and allied micronutrients.

Rice bran and maize hulls are the main by-products of milling that may have little value and are allowed to accumulate outside mills. This creates a health and environmental hazard and also increases the risk of contaminating products in the mill.

Millers may have to pay to have the bran removed to a disposal site which increases the operating costs of the mill.



Cereal byproducts are use as source of income:

- Bran may be sold to local chicken or egg producers as poultry feed
- Making fuel briquettes to replace charcoal for domestic cooking
- Compressing the bran with glue as wood for furniture making
- Using it as reinforcing material to strengthen concrete blocks.

5.2 Types of cereal byproduct

Cereal bran: known as miller's bran it is the hard outer layers of cereal grain. It consists of the combined aleurone and pericarp.

Cereal germ: is a cereal a reproductive part that germinates to grow into a plant it is the embryo of the seed. Therefore bran, germ is often a by-product of the milling that produces refined grain products.

Fine particles: a finer grain size of a greater density of grain boundaries which affects a material ductility in different ways. Grain boundaries are known dislocation anchoring which lowers ductility. Finer grains also mean there are more grain boundaries. Aspiration of flour is also considered as by-products in milling process.

Bread crump: tiny pieces of dry bread.

Bread crumbs (crispiness) is consist of crumbled bread of various dryness, sometimes with seasonings added, **used for** breading or crumbing foods, topping casseroles, stuffing poultry, thickening stews, adding inexpensive bulk to soups, meatloaves and similar foods, and making

Broken grain: broken grains of rice left over the drying and milling process.

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. How to maintain and ensure storage area of grain
2. Write by products of cereal that occurred during milling
3. What is the purpose of ensuring the storage area?

Note: **Satisfactory rating – 6 points Unsatisfactory - below 6 points**

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

Operation Sheet 1- Methods of clean storage site of weeds, dust and spillage

Procedure 1: prepare clean storage site

Step1. Ware appropriate PPE

Step2. Having storage site of cereal/products (warehouse)

Step3.prepare appropriate cleaning device/instrument

Step4.picking up large particles from the floors with tools

Step5.sweepping dust particles from the floor and walls

Step6.spray the appropriate cleaning chemical with spraying machine

Step7.swepping the site with broom

Step8.clean with cleaning agent

Step9.drying the storage site

Step10.rinsing the floor with broom

Step11.finally cleaning completely removing waste/impurity

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

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

Task1. Apply cleaning technique for storage site

LG #35	LO 5: Handover production and packaging system operation

Instruction sheet

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

- Maintaining workplace records
- Carrying out Handover with workplace procedures.
- Process operators aware equipment system and status at handover completion

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Maintain workplace records
- Carry out Handover with workplace procedures.
- Process operators aware equipment system and status at handover completion

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
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1- Maintaining workplace records

1.1 Maintaining workplace records

Records/reports records provide evidence that the relevant specifications and /or instructions have been complied with. Records should be made or completed at the time each action is taken. Any change to a record should be approved, signed and dated by authorized persons.

The level of documentation will vary depending on the product and stage of packaging. The records should enable the entire of a batch to be traced. Additionally, the records should form the basis for assessment of the suitability and certification and release a particular batch of packaging.

To maintain your records in the workplace you should have to:

- Storing paper records takes up a large amount of space and requires extensive time to file properly
- Make in kaizen to obtain automatically
- Use reporting functions
- Designate an Employee
- Get training record Management System.

As a minimum, the following should be recorded:-

- The delivery of raw materials, starting material, bulk, intermediate as well as primary packaging materials.
- name receipts of the material on the delivery and containers as well as any house name" and internal code of packaging ,supplier's name and manufacturer's name, batch or reference number total quantity received
- Date of receipt unique receipt number assigned after receipt; and any relevant comment.

A batch packaging record should be kept for each batch processed; it should contained the following information:

- Name of the product and batch number
- Dates and times of commencement of critical intermediate stages and of completion of production
- Quantities and batch number of each starting material
- Quantities and batch number of critical raw materials

1.2 Documentation & Records

Appropriate documentation & records including incoming material checks, inspection and testing, calibration of safety equipment, operational controls (such as temperature, pressure, time etc.), product recall and traceability, storage, cleaning and sanitation, pest control, medical examination and health status of food handlers, training etc. Shall be maintained in a legible manner, retained in good condition for a period of one year or the shelf life of the product whichever is more.

Any changes to records should be traceable (for example, errors are identified by a strike out and followed by initials). Each entry on a record should be signed and dated by the responsible person at the time the specific event occurred.

1.3 The purpose of records

Accurate record keeping is essential to the application of a preventive control plan. Your records should be sufficient to enable you to confirm easily and with confidence that your preventive control plan is implemented and working effectively. Example:

- Identify the root cause of an issue
- Analyze and improve a process or procedure
- Identify gaps in training and in training needs

Maintain Workplace Information

- Collect information in a time and ensure relevant to organizational needs
- Use business equipment/technology to process information in accordance with organizational requirements.

- Record information.

Record keeping procedures

- Provide instructions on how to fill out the record (who, what, how, when)
- Identify where completed records are kept.
- specify how long records must be kept

Appropriate and accurate records are essential to ensure effective monitoring of the HACCP system and demonstration of compliance with food safety requirements.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction:

Test I: Short answer questions

1. In packaging place what types of information is recorded
2. To maintain the workplace what you have to record to safe work area

Test II: Choice

1.Which one of the following not the purpose of records

A. Identify the root cause of an issue
B. Analyze and improve a process or procedure
C. Identify gaps in training and in training needs
D. Rendering the work back

2. Which of the following information is a recorded in batch packaging

A. Name of the product
B. batch number
C. Dates and times of completion of production
D. Quantities of product
E. all

Note: **Satisfactory rating – 8 points Unsatisfactory - below 8 points**

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

Information Sheet 2- Carrying out Handover with workplace procedures.

1.1 Carrying out Handover with workplace procedures.

Handover is a process of controlling or maintain work and workplace information and procedure. Handover is a process not a date. Planning the work schedule that should be started from the packaging process and it should be viewed as an incremental transfer of knowledge and operation from packing team to business-as-usual. The benefits and deliverables material must be measurable and communicable from the start.

Handover is may be done in person or via recording/communication systems according to workplace arrangements.

Workplace communication is the process of exchanging information and ideas, both verbal and non-verbal between the working team and another person/group within an organization that tremendously important for organizations because it increases productivity and efficiency.

The purpose of handover is the accurate reliable communication between the team of task-relevant information across shift changes or between teams there by ensuring continuity of safe and effective working.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. What is Workplace Communication?
2. What is handover in the workplace

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

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

Information Sheet 3- Process operators aware equipment system and Status at handover completion

3.1 Process operators' aware equipment system

Process Operators is oversees and manage the full production process of a manufacturing plant or other industrial facility. Operator monitors packaging equipment to ensure the quality, efficiency and safety of the plant. Process Operators are skilled or professionals who often work as part of a team and provide leadership.

3.2 Process operators' aware packaging machine system according to the following:

- Aware Good manufacturing Practice (bump caps, ear plugs, safety shoes, uniforms, etc.)
- Aware as packing machines are work and operate correctly allocated according to split and utilized to meet production requirements.
- Aware change over bag maker and weighers when required sufficient materials are available for production requirements.
- Aware required bag maker/weigher efficiency and machine maintenance run optimally.
- Aware Minimization of film waste to below 0.8%
- Maintaining good housekeeping – according to AIB, FSSC 22000 standards and safety regulations
- Execute packaging system on allocated bag makers and ensure compliance in audit
- Ensure line balancing at all times as per planned split
- Aware time management and accurate input of data and Allergens in packaging.
- To aware starting and shutting down procedure of machine.
- aware implementation of packaging and maintenance
- aware packaging safety procedure and food safety device
- Stand and move throughout the department most of the time working

3.3 Status of operator at handover completion

Completion of the handover is a site inspection if required, both by recording status / progress on safety critical items required to be completed work .The Handover Sheet will provide the incoming operator with a sound.

Skills of processing operator

- Good speaking and writing skills
- Effective communication, technical, problem solving and organizational skillful
- Written communication and numerical skills are essential
- Work as a team member, good communication skills
- Setting-up, operates, and troubleshoots machines
- Operates filling, capping, sealing, and labeling of product
- Operates case erector, packaging, sealing, and palletizing equipment

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. How the operator operate the equipment/machine
2. What are the skills of operators in machine operation

Note: **Satisfactory rating – 20 points Unsatisfactory - below 20 points**
You can ask you teacher for the copy of the correct answers.

LG 36	LO# 6: Shut down the production and packaging system

Instruction sheet

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

- Identifying shutdown procedure
- Shut down the system
- Identifying and reporting maintenance requirements

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify shutdown procedure.
- Shut down the system
- Identify and report maintenance requirements

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
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1- Identifying shutdown procedure

1.1 Introduction

Lock-out working procedures safe in order regulate the required that all powered machinery or equipment shut down for maintenance or repair must be secured against the possibility of the equipment being accidentally turned on while being worked on.

To safeguard the person working on such equipment, plug off procedures must be posted near the equipment, and the procedures listed must be followed before repairs or maintenance can start. Plug off a machine usually means the power feeding the machine is disconnected either by pulling a plug, placing a switch in the off position, or turning a circuit breaker to the off position.

The disconnected circuit is then secured in the inoperative position by the use of a padlock. The person doing the maintenance or repair keeps the key to this lock until the work on the machine has been completed. The worker then removes the lock and the machine is again operable.

1.2 Machine Shutdown procedure

The shut-down procedure is an important start-up procedure for both an extruder and an injection molding machine. By properly shutting down the equipment, the start-up will be much quicker and most effective.

Procedure

- Close the hopper slide gate and stop the flow of material into the feed throat of the equipment. On an extruder you will notice that the drive load will start to decline. For the injection molding process, several "air shots" can be performed.
- Running out the screw speed should be reduced to 15-20 rpm so as not to damage the contact surfaces of the screw and barrel.
- When it is visible the amount of extrudate coming out of the die or nozzle has totally diminished, the screw rotation can be stopped.

- The feed throat cooling should remain on; unless the equipment is going to shut down for an extended amount of time (then it can be turned off just as the barrel zones should be turned off). If the shutdown is only for a short period (less than 8 hours) the screw cooling should also be left on.
- The equipment can be totally shut down.

The main objective is to evacuate resin from the feed section of the remaining portion of the screw. If the feed section of the screw is not evacuated, resin will begin to melt onto the root of the screw.

1 3 Cleaning procedure after shutdown operation

- Plug off the machine
- Use detergents, water and clean with schedules by the machine owner and depend on the type of product being processed as well as ambient environmental conditions (temperature, humidity, dust levels, vibrations, etc).
- If you're unsure about how often to clean your pouch packing machine, start by thoroughly cleaning the equipment once per shift. Evaluate the effectiveness of this schedule and then adjust accordingly.

Figure1.Hot water cleaning

Self-Check – 1	Written test

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test I: Short answer questions

1. What is shut down procedure?
2. Write steps of shut down procedure
3. Write purpose of shutdown
4. After shutdown the packaging machine what you have to do

Note: **Satisfactory rating – 20 points Unsatisfactory - below 20 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 2- Shut down the system

2.1 Shut down the system workplace procedures

Normally shutdown is the steps to render the packaging systems safe. System shutdown brings the system to a condition in which it is safe to turn off the packaging and production machine. All machine system plug of from the cables and power source then the machine is displayed informing the user that the machine can be turned off.

An equipment component is normally shut down manually when it is no longer required for duty or during inspection or maintenance. A shutdown can also occur in an emergency when an emergency shutdown button is pressed and a trip is activated by an automatic shutdown system.

Condensation within closed portions of machinery can also be problematic which needs to keep control of the product being packaged.

Paper bag folding & closing filling machine

- Bag closing & gluing system.
- Fully synchronized functions and control.
- Fast and Easy Adjustable size change (1-5 Kg).
- Machine production speed up to 30 bags a minute.
- Aluminum plated Chrome-Nickel alloy heater.
- Coding printer for batch, production, and expiry information

Main disconnect switch

Line valve

Motor disconnect

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test I: short answer

1. Explain shut down system
2. Write steps of shut down system

Note: **Satisfactory rating – 4 points Unsatisfactory - below 4 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 3- Identifying and reporting maintenance requirements

3.1 maintenance requirements

Resources required include labor, component, materials, and tool costs.

Operations of all activities associated with the routine, day to day use, support, and maintenance buildings requirements are: fault of routine maintenance, services and cleaning agent, fire protection services, pest control, grounds care, landscaping for maintenance. Equipment may include mechanical assets, tools, heavy off-road vehicles, and computer systems.

3.2 reporting maintenance requirements

Reporting is providing information about serious wrong doing that you have become aware of at your workplace/ place of study.

Table 3: Equipment breakdown maintenance report format

S. No.	Name / Code No. of the Machine / Equipment	Location	Nature of Breakdown	Details of repairs carried out	Breakdown Period	Work Done by	Remarks
1							
2							
3							
4							
5							

3.3 Types of maintenance

- Corrective maintenance
- Preventive maintenance
- Risk-based maintenance
- Condition-based maintenance

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. what is maintenance report
2. What is maintenance
3. Write the types of maintenance and discus them

Note: **Satisfactory rating – 4 points Unsatisfactory - below 4 points**

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

LG 33	LO#7: Contribute to continuous improvement of the production and packaging system

Instruction sheet

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

- Reviewing system performance
- Identifying and investigating opportunities for system improvement
- Developing and implementing proposals for improvement

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Review system performance
- Identify and investigating opportunities for system improvement
- Develop and implementing proposals for improvement

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
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1- Reviewing system performance

1.1 Reviewing system performance

Continuous improvement is taking an established production process and looking for ways to incrementally improve the production process. Although individual changes may not seem to have a major impact, the aggregate mean of significant change and improvement to the manufacturing process.

This means that optimizing food process packaging systems requires taking an assessment view of packaging decisions and processes.

Improving throughput in food packaging processes starts with packaging design. A review of food packaging design includes looking for unnecessary materials including too much protective material encasing the product. Using standardized package sizes for multiple products means that standardized equipment can be used and change-over times can be reduced. Too thin a film can lead to film feed breakages and rejects due to holes being turned in wrapped packages.

Using pre-printed packaging may reduce packaging steps, changeover times and rejects due to miss-printed packaging after filling being avoided. Evaluating palletizing and warehouse systems can reduce rejects due to damage after packaging and can reduce the steps in getting packaged goods to market.

Recognizing that packaging lines operate within a larger system as noted above, food packaging process throughput is often dependent upon everything that happens in the value chain before the line itself.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test I: Short answer

1. What is system performance?
2. How to improve the performance of equipment
3. What is continuous improvement

Note: **Satisfactory rating – 20 points Unsatisfactory - below 20 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 2- Identifying and investigating opportunities for system improvement

2.1 system improvement

Food packaging lines processors have to take into account as they seek to measure and optimize packaging system throughput, including when using OEE methods.

Optimizing throughput through packaging lines then requires taking into account the type of line being optimized as well as the overall value stream from product being delivered to the packaging process to the warehousing and shipping of the product.
For packaging line operators, managers and Employees looking to increase line efficiency and throughput by minimizing downtime, gathering accurate information about their packaging line is the first step.

By committing to the measurement of performance of the line, operators can fully analyze the performance of the line and where improvements can occur and encouraged to benchmark and objectively analyze their performance, as well as that of the line, become improved to find ways to create efficiencies to the benefit of the entire operation.

Continuous improvement is taking through individual changes may not seem to have a major impact, the aggregate means significant change and improvement to the manufacturing process. To improve your packaging system you should apply the following functions of product packaging such as: Protection, communication, convenience, and containment in order to serve the following purposes:

I. To prevent the product from leaking or breaking, protect it against possible contaminations.
II. To communicate important information about the contained food product and its nutritional content and to provide cooking instructions.
III. To provide convenience that allowing consumers to reheat the contained food in a microwave.

IV. To provide containment for ease of transportation and packaging systems used for foods.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

1. What is system improvement in packaging process
2. What is the use of improving packaging system
3. How to optimize the packaging system

Note: **Satisfactory rating – 6 points Unsatisfactory - below 6 points**

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

Information Sheet 3- Developing and implementing proposals for improvement

3.1 Developing and implementing proposals for improvement

A Proposal Development Process helps packaging system respond production. Having an established proposal development process should help ensure to organizations develop the best proposal possible that satisfies all the buyers needs and requirements.

3.2 Proposal implementation

- Define target of proposal.
- Map your process and resources.
- Arrange yourself to win and ready to start your lay out process
- Take stock of your resources.
- Establish your implementation plan.

Implementation is the process of carry out or accomplishes the packaging system it is used in reference to a government plan or act. The process of turning formal plans a to very detailed conceptual plans that affect many into reality

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction: Short answer questions

Test I: Short answer

1. What is implementation?
2. Proposal implementation

Note: **Satisfactory rating – 20 points Unsatisfactory - below 20 points**
You can ask you teacher for the copy of the correct answers.

Reference

FAO (Food and Agriculture Organisation), 72 Buganda Rd, Kampala

AEATRI (Agricultural Engineering and Appropriate Technology Research Institute), PO Box 7144, Kampala, Email: aeatri@starcom.co.ug

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European Union, the search page to find any EU Regulations (legislation in force), draft Regulations, dates of applicability, http://europa.eu.int/eur-lex/en

European Union, Food Safety – From the Farm to the Fork – Site Map, http://europa.eu.int/comm/food/site_map_en.htm

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Answer

LG 31.

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