Confectioner processing

Level-II

Based on May 2019, Version 1 Occupational standards

Module Title: - Operating Packaging Process

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Table of Contents

LG #81	LO #1 Prepare the equipment and process for operation

Instruction sheet

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

- Confirming packaging materials
- Identifying and confirming cleaning and maintenance requirements
- Fitting and adjusting machine components and related attachments
- Entering operation of equipment and processes parameters
- Loading material , product and packaging components
- Checking and adjusting equipment performance
- Carrying out pre start checks

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 packaging materials
- Identify and confirm cleaning and maintenance requirements
- Fit and adjust machine components and related attachments
- operate equipment and processes parameters
- Load material , product and packaging components
- Check and adjusting equipment performance
- apply pre start checks

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 packaging materials

1.1 Introduction

The right selection of packaging materials and technologies maintains product quality and freshness during distribution and storage. Materials that have traditionally been used in food packaging include glass, metals (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. As research to improve food packaging continues, advances in the field may affect the environmental impact of packaging.

1.2 Materials Used in Food Packaging

Packaging has to be sturdy, attractive, economical and yet non-toxic. It must act as a physical barrier to protect food from contamination and must also preserve the nutrients through avoiding interaction of food with oxygen, carbon dioxide and humidity. Besides these the important properties of packaging material are their physical, chemical, biological and thermal stability, impermeability to liquids and special properties like X- Ray resilience.

Packaging materials include:

- Glass containers
- Plastic containers: can, Bottles Pet, plastic pouch
- Paper /carton box

Fig 1 packing product

- **Glass**

Glass containers used in food packaging are often surface-coated to provide lubrication in the production line and eliminate scratching or surface abrasion and line jams. Glass coatings also increase and preserve the strength of the bottle to reduce breakage. Improved break resistance allows manufacturers to use thinner glass, which reduces weight and is better for disposal and transportation. The transparency of glass allows consumers to see the product, yet variations in glass color can protect light-sensitive contents. Finally, glass packaging benefits the environment because it is reusable and recyclable. Like any material, glass has some disadvantages. Despite efforts to use thinner glass, its heavy weight adds to transportation costs. Another concern is its brittleness and susceptibility to breakage from internal pressure, impact, or thermal shock.

Fig 1 bottle packing

- **Metal**

Metal is the most versatile of all packaging forms. It offers a combination of excellent physical protection and barrier properties, formability and decorative potential, recyclability, and consumer acceptance. The two metals most predominantly used in packaging are aluminum and steel. Aluminum is commonly used to make cans, foil, and laminated paper or plastic packaging, aluminum is a lightweight, silvery white metal derived from bauxite ore, where it exists in combination with oxygen as alumina. Magnesium and manganese are often added to aluminum to improve its strength properties.

Fig 1 metal container

- **Plastics**

Multiple types of plastics are being used as materials for packaging food, including polyolefin, polyester, polyvinyl chloride, polyvinylidene chloride, polystyrene, polyamide, and ethylene vinyl alcohol. Although more than 30 types of plastics have been used as packaging materials. Polyolefins and polyesters are the most common. The most commonly used polyester in food packaging is Polyethylene terephthalate (PET).

Fig 3 plastic packing

Paper

Paper is made from cellulose, trees being the main source of cellulose fiber (or wood pulp). Besides wood pulp, paper can be made from other materials such as cotton, flax, esparto, straw, hemp, manila and jute. Some of the pulp properties depend upon the process used to separate the fibers from the timber. The fibers are pulped and/or bleached and treated with chemicals such as slimicides and strengthening agents to produce the paper product. Paper and paperboards are commonly used in corrugated boxes, milk cartons, folding cartons, bags and sacks, cups, wrapping paper, tissue paper and paper plates. Laminated paper is used to package dehydrated products such as ready to serve soups, spices and grounded herbs.

Figure 2 paper containers

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: Choose the best answer for the following question (each 4 point)

1. One is not packaging material?

A. Paper B. glass C. metal D. none of the above

2. Which one of the following is the purpose of packaging?

A. Protect the product B. store the product C. carry nutritional information D. none

Test II: Short Answer Questions

1. Define vacuum packing (2 point).
2. Write down the use of blister packing (5 point).
3. List appropriate packaging materials (5 points)

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

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

Information Sheet 2 Identifying and confirming cleaning and maintenance Requirements

2.1 Cleaning

Cleaning is the complete removal of food soil using appropriate detergent chemicals under recommended conditions. It is important that personnel involved have a working understanding of the nature of the different types of food soil and the chemistry of its removal.

2.2 Cleaning Methods

There are a number of methods which can be used to apply detergents and disinfectants.

2.2.1 Manual cleaning

Manual cleaning using cloths, mops, brushes, pads, etc. It is normally used in small areas, equipment that is non-water proof or requires dismantling or areas which are difficult to clean by other methods. It is a labor intensive method and may limit the use of certain chemicals for safety reasons. To ensure cleaning is effective the method must be clearly defined and staff trained to an appropriate level.

Fig 6 brume cleaning

2.2.2 Foam cleaning

This is the common method for cleaning most food operations. A foam blanket, created using a wide range of available equipment is projected from a nozzle and allowed time to act on the soil. It is then rinsed off with the released deposits. Large areas such as floors, walls, conveyors, tables and well-designed production equipment are ideal for foam cleaning. Foam is a carrier for the detergent. The foam should be applied in an even layer. Coverage rates are quick and chemical usage is economical.

Fig 3 foam cleaning

2.2.3 Spray cleaning

Spray cleaning uses a lance on a pressure washer with chemical induction by venture. This method can be wasteful of chemical and can be slow to produce foam. It should be used where foaming properties are not essential for the cleaning action.

Fig 6 polish mirror

2.2.4 Fogging cleaning

Fogging uses compressed air or other equipment to generate a fine mist of disinfectant solution which hangs in the air long enough to disinfect airborne organisms. It will also settle on surfaces to produce a bactericidal effect. The system can come in a small portable device or built in automatic central systems. Fogging should never be used as a primary sanitizing method. It should be used in conjunction with other methods. It is also important to ensure that coverage and saturation is sufficient and the mist is fine to allow proper action.

Fig 7 disinfectant of surface

2.2.5 Machine washing

This is normally an automatic or semi-automatic washing process conducted within a purpose built machine. There are many machine designs depending on the application. But failure to maintain them correctly can lead to a contamination risk to the product. Chemicals used in these machines should be low foaming. An effective system for controlling the dose of chemical should be employed and temperature control systems should be used where critical.

2.2.6 Cleaning in place (CIP)

Cleaning-in-place (CIP) is an automatically performed method of cleaning, applied to remove residues from complete items of plant equipment and pipeline circuits without dismantling or opening the equipment. It is a system of cleaning engineered to provide fast, productive, consistent and reproducible high quality cleaning of all product contact surfaces to a predetermined level of cleanliness, by circulating chemical (detergent and disinfectant) solutions and rinsing water through tanks and

piping of a food processing plant that remains assembled in its production configuration, and by jetting or spraying of the product contact surfaces under conditions of increased turbulence and flow velocity.

2.2.7 Cleaning procedure

Cleaning is a complex process. To ensure it is conducted correctly a defined and systematic approach is required that takes into account a number of factors previously covered. This approach takes the form of a Procedure and this is usually a legal requirement in addition to a fundamental requirement of global food standards. A collection of these cleaning procedures forms a Cleaning Plan or Program which is plant specific.

The correct sequence of a general cleaning procedure for surfaces in a food plant is:

- Gross Clean/Preparation
- Pre-rinse
- Detergent application
- Post-rinsing
- Disinfection
- Terminal rinsing

2.2.8 Legal cleaning requirements

Compliance regarding cleaning of food premises

Make sure that:

- Processing rooms are designed and laid out so as to permit good food hygiene practices
- The lay out, design, construction, sitting and size of food premises, including facilities for cleaning and storing working utensils and equipment and refuse stores, allow for adequate cleaning.
- In rooms of processing the design and laid out are to permit good food hygiene practices, including protection against contamination between and during operations.
- In particular floor surfaces, wall surfaces, doors are to be easy to clean and where necessary, disinfect. Windows and other openings fitted with insect proof screens which can be easily removed for cleaning.

2.3 Maintenance requirements

Maintenance is a general upkeep and repair of equipment, buildings and grounds, heating and air-conditioning; removing toxic wastes; parking; and perhaps security.

Food premises and equipment that are not kept in good repair and condition are a potential source of microbiological and physical contamination of food. Poorly maintained premises and equipment cannot be cleaned effectively. Poor maintenance may allow the entry of other sources of physical, microbiological and chemical contaminants such as water, pests and dust. Poor maintenance can have health and safety implications for workers. Maintenance may include:

- Hand sharpening
- Cleaning
- lubricating
- Tightening
- Simple tool repairs and adjustments

2.3.1Types of maintenance

Basically there are two types of maintenance:-

1. **Preventive or proactive maintenance:** is carried out to keep something functional. This type of activity is usually planned and scheduled.
2. **Corrective or reactive maintenance:** is repairing something to get it working again. This is an unscheduled, unplanned task, usually associated with greater hazards and higher risk levels. Routine maintenance tasks refer to:

2.3.2 **Procedure for maintenance safely**

Do maintenance safely:

- Always disconnect powered tools before servicing, adjusting, machine cleaning or repairing them, sharpening or changing accessories such as blades.
- Follow the manufacturer's instructions in user's manual for maintenance and servicing (e.g. lubrication, cleaning) and changing parts and accessories.
- Use appropriate tools and equipment while carrying out maintenance
- When maintenance is complete workers have to check if the maintenance has left the portable tools in a safe and functioning condition:
- Replace all guards and safety devices
- Record your inspection and actions, sign out and pass the tool to the worker or store it safely

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 1 say true or false for the following

1 Replace all guards and safety devices.

2 Not Record your inspection and actions, sign out and pass the tool

Test I: Give Short Answer Questions (each 5point)

1. Define cleaning?
2. Write cleaning methods?
3. Write the correct sequence of general cleaning procedures?
4. Mention types of maintenance?

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

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

Information Sheet 3- Fitting and adjusting machine components and related attachments

3.1 Fitting and adjusting machine components and related attachments

Before allowing someone to start using any machine you need to think about what risks there are and how these can be managed. Before starting any operation the operator should be check the main parts of the equipment appropriately and identify faulty and unfit parts or components of the machine then adjust and fit all parts or components of the machine identified based on operation procedure standards.

Adjusting means to **change** something slightly to make it fit, work better, or be more suitable.

Fitting is a part, especially one of a standard size or shape, that goes with a larger system. Fitting that is used to join two or more components together. Fitting is a part, especially one of a standard size or shape that goes with a larger system

Adjusting machine components:_

1. Dough mixer machine

2. Forming machine

3. Cutler machine

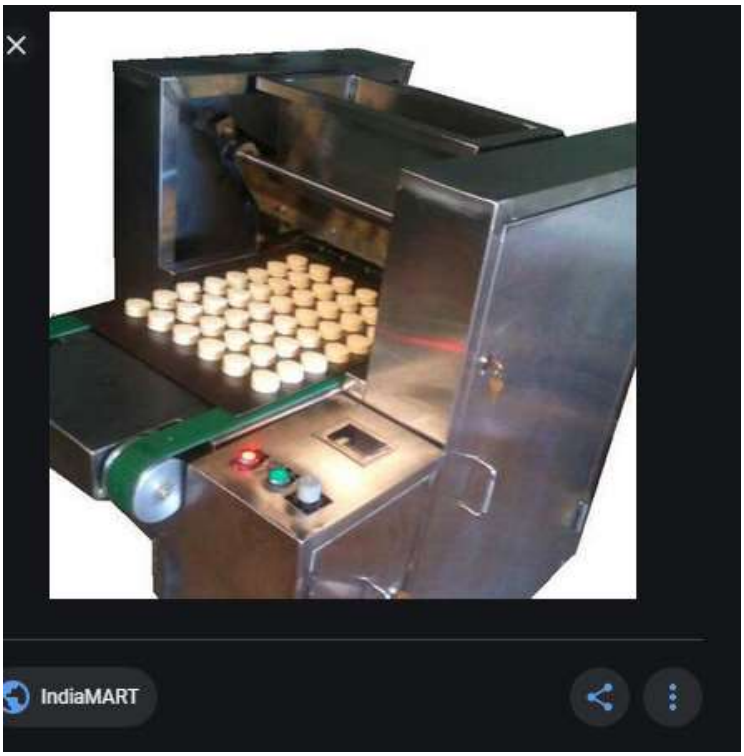

Fig1 adjusted cookies machine

3.2. Adjustment of Machine operation

- **Safety check:**

Check and make sure there is no foreign matter on:

- The conveyer belt
- Working table
- And end sealing knives and there is no other person around the machine.

- **Switch on the power:**

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

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 choose the best answer

1 one is the following is Adjustment of Machine operation (2point)

A safety check B maintaining workplace C packaging D none

Test II: Give Short Answer Questions

1. What is the main purpose of safety checks? (5 points)
2. Write down the main parts of the machine to be check? (5 points)

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

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

Information Sheet 4- Entering operating parameters to meet safety and production

4.1 Entering operating parameters to meet safety and production

The basic operating principles of equipment, such as main equipment components, status and purpose of guards, equipment operating capacities and applications, and the purpose and location of sensors and related feedback instrumentation

Operating procedures are followed to start and operate equipment to achieve required outcome. Provision of clear, concise and accurate operating procedures is the most effective measure to prevent, control and mitigate accidents.

This procedure aims to:

- Increase employee awareness on the safe use of equipment used in the workplace;
- Ensure that work equipment is suitable for the purpose for which it is to be used or has been provided;
- Ensure that work equipment is inspected at regular intervals;
- Ensure that work equipment is maintained in good working order and kept in a good state repair;
- Ensure employees receive relevant information, instruction and training (where this is required and/or appropriate) in relation to using work equipment.

Operating Parameters to Meet Production Requirement

A production requirement is containing all the requirements to a certain product. It is written to allow people to understand what a product should do. generally avoid anticipating or defining how the product will do it in order to later allow interface product and production to use their expertise to provide the optimal solution to the requirements**.**

4.1.1 Operating Parameter to Meet the Safety

4.1.2 Safety instructions procedures

The Technical safety procedures are:

a. Installation and repairs may only be carried out by an authorized service technician. Installation, repairs and other work by unqualified persons can cause considerable danger to users.

b. A damaged packaging machine could be dangerous. Before building in the machine, check it for any externally visible damage. Do not use a damaged machine.

c. To avoid the risk of damage to the packaging machine, make sure the connection data (fuse rating, voltage and frequency) on the data plate corresponds to the supply before connecting the machine to the mains supply. Consult a qualified electrician if in any doubt.

d. Do not connect the packaging machine to the mains electricity supply by a multi-socket adapter or an extension lead. These are a fire hazard and do not guarantee the required safety of the 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 1 choose the best answer for the following question (2 point)

1 which of the following is operating procedures?

A Ensure that work equipment is suitable B Ensure that work equipment is inspected C Ensure employees receive relevant information D all

Test I: Give Short Answer Questions

1. What is the aim of operational procedure during operating the machine or equipment**? (5pts)**
2. Comprehensive written operating procedures was generated which were applicable to address what? **(5pts)**

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

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

Information Sheet 5- Loading material, product and packaging components

5 .1 Loading material, product and packaging components

Different confectioner should be kept separate “new” (fresh) ingredient into “old” confectioner in particular should be avoided for oxidative quality reasons. It is preferable to transfer different confectioner 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 product and package during loading and unloading.

Before the transfer of dry raw material and high confectioner, sweetener in storage tanks, shore tanks, ship tanks and road and rail tanks; the confectioner should be brought to transfer by cooling the temperature is chosen according to confectioner and sweetener and also to minimize damage to the confectioner.

Sweetener transfer temperature:

- Long term storage of all sweeteners should be at ambient temperature and no heating should be there.
- If the sweeteners become solid during storage, extreme care should be taken during initial temperature, ensuring no overheating.
- Temperature at loading and unloading should refer to the average of top, middle and bottom temperature readings.
- Different confectioner grades/types should be kept separate.
- Ingredient ‘new’ confectionary into ‘old’ confectionery should be avoided for oxidative quality reasons.
- The order of loading and discharge should be carefully chosen to minimize adulteration.

Loading material

- Pallets
- Skids
- Slip sheets
- Tote pans
- Pallet boxes/skid boxes
- Bins/baskets/racks
- Cartons
- Bags

Pallets

Platform with enough clearance beneath its top surface (or face) to enable the insertion of forks for subsequent lifting purposes

Martials: Wood (most common), paper, plastic, rubber, and metal

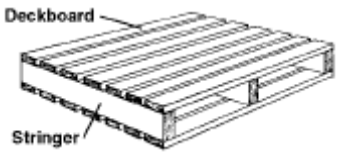

Fig 1pallet

Skids

Platform (typically metal) with enough clearance beneath its top surface to enable a platform truck to move underneath f or subsequent lifting purposes

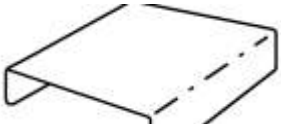

Fig 2 Skids

Slip sheet

Thick piece of paper, corrugated fiber, or plastic upon which a load is placed

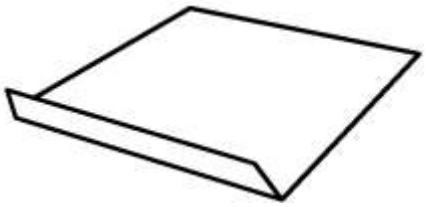

Fig 3 Slip sheet

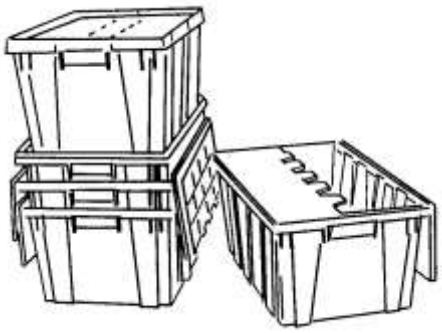

Fig 4 top pan

Loading product

- Cookies
- gum base
- Sweeter
- chocolate
- biscuit
- caramel

Packaging component

- Plastic
- Glass
- Carton
- paper

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: say true or false

1 Before transferring the dry raw material and high confectioner is storing in tank (2point)

2 the order of loading and discharge should be carefully chosen to minimize waste. (2point)

Test II: Short Answer Questions (each 5 point)

1. Write loading techniques of food processing? (5 points)
2. Write principles of loading? (5 points)

Note: **Satisfactory rating -≥ 7 points** **Unsatisfactory - below 7points**

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

Information Sheet 6 Checking and adjusting equipment performance

6.1 Checking and adjusting equipment performance

Measure the packaging line efficiency, its throughput, if the equipment is operating at maximum speed, and so on. These data points give you a measure of a piece of the system but not necessarily an overall view of how effective the equipment is.

6.1.1 Overall equipment effectiveness (**OEE**)

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 run. It identifies 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 metric for identifying losses, bench-marking progress, and improving the productivity of manufacturing equipment (i.e., eliminating waste)

6.1.2 Total effective equipment performance (TEEP)

Total effective equipment performance is a closely related measure which quantifies OEE against calendar hours rather than only against scheduled operating hours. A TEEP 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 however an 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 indicator (KPI) in conjunction with lean manufacturing efforts to provide an indicator of success. OEE can be illustrated by a brief discussion of the six metrics that comprise the system.

6.1.3 Factors Affecting Overall Equipment Effectiveness (OEE)

Packaging machinery manufacturers institute (PMMI's) Primary Packaging Line Play book explains that Overall Equipment Effectiveness is a combination of three factors:

- **Availability** - Making things at 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)

Put simply, 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 may be applied to any individual Work Center, or rolled up to Department or Plant levels. This tool also allows for drilling down for very specific analysis, such as a particular Part Number, Shift, or any of several other parameters. It is unlikely that any manufacturing process can run at 100% OEE.

6.1.4 Equipment performance

Equipment performance considers the following points:

- Availability
- Maintainability
- Reliability
- Level of the system
- Sub-system
- Components of the equipment and machinery

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 say true or false for the following question

1 Overall Equipment Effectiveness is a combination of availability and quality(3point)

2 Equipment performances is not considered Maintainability and Reliability (3point)

Test 2: Short Answer Questions (each 4 point)

1. Define Overall Equipment Effectiveness? (4 points)
2. Write down factors that affect Overall Equipment Effectiveness? (4 points)

Note: **Satisfactory rating - ≥7points** **Unsatisfactory - below 7points**

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

Information Sheet 7- Carrying out pre start checks

7.1 Carrying out pre start checks

In an industry, there are many types of works to be operated. For example: machine and laboratory operation. So before we are going to operate machine/lab equipment we have to inspect /check whether it was in a good operating condition or not. Checking conditions of operating equipment has a vital role for the operator's safety, quality of a product and also for equipment safety.

- **Operators always have to check the following just before going to manipulate operations**
  - Parameter setting (pressure, temperature, flow.
  - Identify faulty conditions.
  - Analyze maintenance requirements.
  - Identify hazards
  - All these can be accomplished by investigating

7.1.1 Conduct Checks on Machine/Equipment

Before allowing someone to start using any machine you need to think about what risks and how these can be managed. So, you should:

- Check that it is complete, with all safeguards fitted, and free from defects.
- The term 'safeguard' includes guards, interlocks, two-hand controls, light guards, pressure-sensitive mats etc.
- By law, the supplier must provide the right safeguards and inform buyers of any risks ('residual risks') that users need to be aware of and manage because they could not be designed out.
- Produce a safe system of work for using and maintaining the machine.
- Maintenance may require the inspection of critical features where deterioration would cause a risk.

- Also look at the residual risks identified by the manufacturer in the information/instructions provided with the machine and make sure they are included in the safe system of work.
- Choose the right machine for the job.

Make sure the machine/ equipment is:

- safe for any work that has to be done when setting up, during normal use, when clearing blockages, when carrying out repairs for breakdowns, and during planned maintenance;
- Properly switched off, isolated or locked-off before taking any action to remove blockages, clean or adjust the machine.

7.1.2 The Pre- and Post-Operation Equipment Inspection Checklist

- Clear any accumulated debris from the equipment's: It's important to check and remove any material from the jobsite
- Check signs of damage
- Check for leaking or pooled fluid around and under the machine: This is an easy indicator that something isn't right, and the source of that fluid should be identified and addressed/fixed before operation.
- Check for new signs of structural damage, scratches or dents on the machine: This is almost more important post-operation than it is pre-operation.
- Inspect the operator compartment and clear away any debris or obstructions.
- Familiarize yourself with the control style and change as needed: Most of today's machine's come with rather simple pattern selectors that allow the operator to use the control pattern that they are most familiar with. This will lead to greater productivity and greater operator satisfaction.
- Identify auxiliary/attachment controls: Each type and style of machine controls attachments differently operators should identify how to properly work their attachment prior to attempting to use it.
- Start the power and review console indicators and warnings. Today's machines are built to give the operator more feedback on the workings of internal systems than ever previously available.

- Review all external surroundings: Know your work site, and the people and structures that exist inside your working envelope. This will ensure optimal jobsite safety and productivity.

7.1.2 The main purpose of carrying out pre-start check

- Workers safety (no injury involved)
- Working is fitted probably
- Electrical equipment is suitable
- Electrical equipment is in good condition

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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 1: say true or false for the following question (5 point)

1: before starting the operation identify the hazards. (5pts)

Test I: Short Answer Questions (each5 point)

1. What are the things in which the machine operators will be always have to check just before going to manipulate operations**? (5pts)**
2. List what you or someone have to do before start using any machine.(5pts)
3. List and discuss in detail what you have to do during performing the Pre-Operation Equipment Inspection on a machine.(5pts)
4. What are the Causes of accidents while working with machinery?**(5pts)**
5. What are the dangerous parts of machinery? (5pts)

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

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

Operation Sheet 1- cleaning procedure

Procedure

Step 1 Wear PPE

Step 2 Identify the cleaning material

Step 2 Gross Clean

Step 3 Pre-rinse

Step 4 Detergent application

Step 5 rinsing

Step 6 Disinfection

Step 7 Terminal rinsing

Operation Sheet 2- Sequence of machine adjustment

Procedure

1. Wear PPE
2. Make the machine on/off
3. check the equipment components
4. Identify not working and un fit parts of the machine
5. Adjust part of the equipment
6. Test the machine

.

Operation Sheet 3- Sequence of operations for surface packing machine

Procedure

1. Wear PPE
2. identify the equipment
3. Clean the equipment
4. Check the packaging machine functionality
5. disinfect the packaging machine before operation
6. operate surface packaging machine

LAP TEST	Performance Test

Name……ID……..Date……

Time started: _____ Time finished: _____

I 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.

Task-1 - cleaning procedure

Task-2- Sequence of machine adjustment machine

Task -3 - Sequence of operations for surface

LG #82	LO2: Operate and monitor the process

Instruction sheet

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

- Starting and operating packaging process
- Monitoring Operation of equipment and processes
- Identifying and reporting Variation in equipment operation
- Monitoring the Process
- Identifying out-of-specification process outcomes
- Maintaining work area
- Conducting work area
- Maintaining workplace records
- Conducting legislative 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:

- Start and operate packaging process
- Monitor Operation of equipment and processes
- Identify and reporting Variation in equipment operation
- Monitor the Process
- Identify out-of-specification process outcomes
- Maintain work area
- Conduct work area
- Maintain workplace records

- Conduct legislative requirements

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Information Sheet 1 Starting and operating packaging process

1.1 Starting and operating packaging process

Packaging: is a coordinated system of preparing goods for transport, distribution, storage, retailing and end-use. A means of ensuring safe delivery to the ultimate consumer in sound condition at minimum overall cost A techno-economic function aimed at minimizing costs of delivery while maximizing sales (and hence profits) and the science, art and technology of enclosing or protecting products for distribution, storage, sale, and use. Packaging has its own importance in business as it allows the products to be transferred from the manufacturing plants to the customers and consumers.

1.2 Functions of Packaging

A. Contain

- Portion control (profitability)
- Company reputation
- Consumer expectation
- Consumer convenience

B. Protect

- Contamination
- maintain quality
- Legislation (Codex, local legislation)
- Product consistency
- Company reputation

C. Inform (labeling)

- Nature of the contents
- Legislation, Codex, and other codes
- Nutrition
- Instructions for use
- Elimination of fraud
- Storage requirements

D. Attract

- advertise that this product is satisfying and fun and healthy

1.2.1 Principles of Packaging

Packaging of food articles should be done in a way that chances of contamination, reaction with packed material, decomposition etc. is avoided. Packaging must be done in appropriate way or as per the norms so recommended by Food and Drug Authority India.

It can be done in multiple layers as enumerated here

Primary packaging: It envelops and holds the food product

Secondary packaging: It is exterior to the primary packaging

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

1.2.2 Packaging and Food Safety

While food packaging is an integral component of food industry and helps to store food and beverages in hygienic manner, it can at times be a cause of concern for food safety. Some packaging materials such as certain types of plastic, polythenes and Styrofoam can release toxins when they are heated and can be dangerous to consumers. Packaging materials which are irradiated (along with food) can transfer unsafe nonfood substances into the food. Food packaging makes use of a variety of substances, including dyes for printing colorful labels, and glues and adhesives for keeping packaging closed. In order to protect consumers effectively, the relevant authority individually certifies each of these food packaging materials subjecting them to rigorous testing protocols.

1.3 Types of packaging

The type of packing depends on various factors e.g. food item, the process of production, and quality of food, shelf life desired, transport considerations, etc. so it is important to consider the shape, size, color, stacking options, printing of labels, cost, environmental attributes (e.g. recyclability, carbon imprint), handling properties, etc.

Packaging includes:

- vacuum packing
- packaging machine
- Modified Atmosphere Packaging (MAP)
- blister packaging or over wrapping

⌑ **vacuum packing**

Vacuum packaging is another way to increase the shelf life of food products. Here the product is placed in an air-tight pack, the air sucked out and the package sealed. By removing air from around the product, the levels of oxygen in the packaging are reduced, impeding the ability of oxygen-breathing microorganisms to grow and spoil the product. The lack of oxygen also reduces the amount of spoilage due to oxidation the process that causes apples and bananas to turn brown; this packaging machine is used for vacuum packaging with packaging materials having a extremely high gas barrier for the purpose of food preservation.

Fig 1 vacuum packing

Fig 1 vacuum sealed

- **packaging machine**

Packaging machinery is used throughout all packaging operations, involving primary packages to distribution packs. This includes many packaging processes: fabrication, cleaning, filling, sealing, combining, labeling, overwrapping, palletizing.

Fig 2 packing machine

- **Modified Atmosphere Packaging (MAP**)

Modifed atmoshere packaging is along establshimened and continuously increasing techniques for extending the shelf of fresh food product.

- advantage MAP
  - increased shelf life of product
  - high quality product and reduced economic lose,
  - product can be distributed long distanees and resulting
- disadvantage of MAP
  - visible added cost, for temperture control requirement .
  - potention growth of food**.**

Fig 3 cookies packing

Packing machine link video

- **Blister packaging or over wrapping**

Blister packaging is one of the best packaging solutions to keep goods both protected and visible at the same time. and also produced by heating a sheet of plastic and molding it into shape to form a bubble or pocket the ‘blister’ that completely covers the product.

Fig 1 blister machine

- **Carton Filling**

Blisters are carefully pushed and transferred from the tray into the carton.

Fig 4 blister packing

❖ **The advantages of blister packing include:**

- Cost savings.
- Increased graphics area.
- Prominent product display.
- Safe and easy opening features.
- Product protection and security.
- Recyclable material options.

❖ **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. In summary the general labeling requirements are:

- The name of the food
- List of ingredients
- Quantitative ingredients declaration (where indicated)
- Net contents and drained weights
- Name and address
- The country of origin
- Lot identification
- Date marking and storage instructions
- Instructions for use and special storage requirement
- General script
- Nutrition labeling

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: Choose the best answer for the following question

1. One is not packaging material? **(each2 point)**

B. Vacuum packing B. blister packing C. packaging machine D. none of the above

2 Which one of the following is the purpose of packaging? **(2point)**

B. Protect the product B. store the product C. carry nutritional information D. none

Test II: Give Short Answer Questions (each 5 point)

1 Define packaging (2 point).

2 Write down the use of packaging (5 point).

3 List appropriate packaging materials (5 points)

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

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

Information Sheet- 2 Monitoring Operation of equipment and processes

2.1 Monitoring Operation of equipment and processes

Monitoring is a systematic process of observing, tracking, and recording activities or data for the purpose of measuring program or project implementation and its progress towards achieving objectives. Information gathered through monitoring is used to analyze, evaluate the all of the components of a project or a department in order to measure its effectiveness and adjust inputs where necessary

Food processors use a variety of machines for different production lines and for various food types. Several machine types are integrated into a single packaging line. Some of the machine types are cartooning, wrapping, labeling, shrinking, sealing, case and tray forming, capping, cooling and drying, feeding, palletizing, picking and placing (robotic systems), cleaning and sterilizing, in addition to inspection and detecting machines. According to the Organization for Machine Automation and Control (OMAC), the number of packaging machine types employed in a packaging line ranges from two to ten:-

Typical equipment

- **Food conveying systems in the plan**t: Medium to large-scale plants require an efficient means for food transport through the assembly line. Usually, transportation is achieved via conveyor systems and they are the real work force. The conveying systems perform functions such as washing, flipping, rotating, pushing, indexing, diverting, or accumulating products at various points in the product line.

Fig 1 ice cream conveyer

- **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.
- **Sealing:** Plain paper 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.
- **Wrapping:** Wrapping is a type of packing in which a solid food is enveloped in a sheet of flexible material, usually paper, cellulose, cloth or foil.

Thermo-form equipment is vacuum form equipment thermoplastic sheet or films over moulds in to finished shape. First the thermoplastic sheet or film is heated with electric or natural gas heater. When the thermoplastic film is cooled the formed part is trimmed from the sheet.

Case packers help you be more productive by packing product quickly and efficiently combi offers drop packers, pick and place packers, horizontal case loaders and semi-automatic, packing machine

Bundlers are tools frontend developers used to bundle are a hot commodity because campaign spending has outstripped the traditional ways of raising money.

Ink jet coders are non-contact printing coders used to print dates, batch numbers, and time on variety of packaging products such as containers and cartons. These coders are majorly used in industries such as food and beverages, personal care products, electronics, automotive, and pharmaceutical.

Labellers. Labelling machines are machines that dispense, apply or print-and-apply labels to various items, products, containers or packages. Labeling machines can apply labels to a variety of products and packages.

Palletiser; is a machine which provides automatic means for stacking cases of goods or products onto a pallet. Manually placing boxes on pallets can be time consuming and expensive.

Shrink wrappers; Shrink wrap, also referred to as shrink film or shrink wrap, is a versatile polymer material used for the packaging of finished goods. Heat is applied to the film – by either a conveyor heat tunnel or an electric or gas heat gun – which catalyses the film to shrink tightly around the item placed within.

Strapper attaches plastic strapping to the load to improve bundling and avoid having individual pieces collapse apart from the pallet. Typically strapping produces less waste by volume than stretch wrap.

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: choose the best answer for the following question

1 which is equipment in vacuum form equipment thermoplastic sheet(3point)

A Case packers B Bundlers C filling D moulder

2 one is Plain paper is not heat-sealable and barrier properties of papers(3point)

A machine B packaging sealing D bundler

Test II: Short Answer Questions

1. Write equipment types on confectioner processing? (5 points)
2. What is wrapping? (5 points)

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

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

Information Sheet -3 Identifying and reporting Variation in equipment operation

3.1 Identifying Variation in equipment operation

3.1.1 Techniques of identifying equipment variations

- Assess quality of received components, parts or materials
- Continuously check received components, parts, materials, information, service or final products against workplace standards and specifications for conformance
- Demonstrate an understanding of how the received components, parts or materials, information or service relate to the current operation and how they contribute to the final quality of the product or service
- Identify and isolate faulty components, parts, materials or information that relate to the operator's work
- Record and/or report faults and any identified causes in accordance with workplace procedures.
- Follow machine manufacturers manual

3.2 Steps of corrective action in response to variations

- **Define the Problem**

Take time to adequately define the problem (who, what, when, why, where, how much and how often).

- **Interim Actions**

Once a problem as been detected, the first priority should be to contain the problem, and prevent shipment to the customer. If already shipped, the customer needs to be notified to prevent further liability.

- **Root Cause Analysis**

The key to resolving a problem is identifying the true root cause. There may be several underlying causes, a new operator, a change in procedure, or another ‘rush

job' circumventing the system. This is why it is important to find the root cause of the issue and define a permanent solution.

- **Permanent Actions**

The process should be reviewed to arrive at a solution for correcting the root cause. This review should engage the 7 basic quality tools. The solution may involve longer term planning, requiring milestone dates, capital justification, training, and/or approval from the customer. It is good to review progress in management review to assure accountability after the Interim Actions have 'stopped the bleeding'.

- **Verification**

Checkpoints in the process should be created to verify effectiveness. This could be accomplished by inspection, internal audits, and/or measurement.

- **Control**

If mistake proofing was not part of the solution, then a measurement to detect the root cause early should become part of the system. A procedural change should become part of the system by updating the work instruction and training for accountability. Consider putting a reaction plan in place should the problem reoccur.

- **Prevention**

Very few organizations reach this step. For example, all the above steps are completed, yet the problem returns 6 months later. Perhaps, a new operator shows up who may have been qualified through 'On-the Job' training without verification of their competency. Or the filter was replaced as part of the solution, but it is dirty again and hasn't been placed on the Preventive Maintenance schedule.

3.3. Reporting Variation in equipment operation

- Report faults and any identified causes to appropriate person
- Separate Useless machine from packaging operation area
- packing storage tank disinfection problem
- packaging machine breakdown

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 say true or false

1 Report faults and any identified causes to appropriate guard(2point)

2 Separate Useless machine from production area.(2point)

Test II: short answer

1. What are the techniques used in identifying equipment variations? (5pts)
2. Mention some techniques of identifying equipment variations? (5 points)

Note: **Satisfactory rating - ≥7 points** **Unsatisfactory - below 7 points**

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

Information Sheet-4 Monitoring the Process

4.1 Monitoring the Process

Monitoring process is a special kind of integration process that you use as part of Business Activity Monitoring (BAM). You use a monitoring process to monitor the milestones in a business process. The business process can be distributed across multiple applications. When a milestone is reached, the applications each publish events, to which a central monitoring process is subscribed.Appetizing cookies packaging process should be proceed in accordance with work place procedures, operation procedures, and should meet specifications.

4.1.1 Selection Criteria for appetizing cookies Packaging Material

Various Factors are focused on appetizing cookies packaging are package design which effect the impulse during purchase. The nature of the packaging material has a notable influence on oil quality Package types.

4.1.2 Recommendations for Immediate Action by Processors

It is recommended that processors question packaging suppliers more closely using a simple checklist that includes:-

- Detail of the content and thickness of the proprietary packaging laminate.
- The supplier quotes the weight of packaging material then they must relate this to the number units per kilogram.
- Confirmation in writing from the packaging manufacturer that the packaging will not interact in an adverse way with the components of the food.
- An assurance in writing that the packaging will perform throughout the shelf life of the product.
- An assurance that the packaging will withstand the special environmental conditions

4.2 Packaging Systems

Traditionally, cookies and cream have been packed in 15kg square tinplate containers. The other types of packages like plastic containers, lined cartons and flexible pouches have been recently introduced. Even though packaging has witnessed many changes, till today about 52% of cookies and cream continue to be traded in loose/unpacked form. This allows a lot of scope to pursue the dangerous practice of adulterating the oil with less expensive and unhygienic varieties. Plastic packaging provides safe hygienically packed oil at competitive cost to consumers. It is extremely important that, whatever the packaging material used, it should be food grade and non-toxic. The product package compatibility is the starting point and shelf-life follows compatibility.

4.3 Packaging specifications and standards

The packaging assessment must include a definition of the optimum quality standards and these standards should not be compromised by cost. Ideally, packaging supplier selection is a techno-commercial decision agreed during discussions between the purchasing function and packaging technologists. Widely used quality management systems are those based on ISO.

4.4 Types of packaging

4.4.1 Primary packaging

In food grade PT (Polyethylene terephthalate) (or metal) bottles, hermetically sealed, of 1l, 3l or 5l according to the order. Bottles to have caps with tamper-proof devices. Weight of empty1L plastic bottles. Supply in tin without cap (to open by piercing) not accepted. Impermeability: No leakage under the pressure of 6 m high stacking.

Impact tests to be carried out on multiple packs ready for supply.

4.5 Secondary packaging

The one cookies to be packed in cartons containing and Containers to be separated from each other with cardboard inside the boxes. The carton of double corrugation, export quality to withstand stacking 6m high for 2 month without deterioration. The sealing of the outer box is with glue or 50mm tape, capable of resisting a tropical climate (humidity and sunshine) for two months. Tape overlaps of 10cm minimum.

Fig- 2. Secondary packaging material

4.4.1 Tertiary Packaging

Tertiary packaging facilitates the protection, handling and transportation of a series of sales units or secondary packaging in order to group everything into unit loads during transportation.

The following are monitoring packaging process

- List any allergens on the label of packaged products
- Identify foods containing allergens, on menus
- Prepare special meals separately from normal meals
- Advise staff serving food of special requirements
- Check packaging for damage, and use only clean, uncontaminated packaging materials
- Store packaging material in a designated area, away from cleaning chemicals and other materials
- That might cause contamination
- Check that materials being used for packaging are appropriate to the food being packed, for example: some packaging materials may not be appropriate for acidic foods, refrigeration, freezing or microwaving
- Make sure that the packaging material being used will not contaminate the food being packed, by physical and chemical contamination
- Make sure that the area used for packing is clean and sanitary before starting and during work
- Ensure that food packaging machinery is maintained in satisfactory working condition, including the use of appropriate lubricants, and make sure these products do not contaminate food

Corrective actions of packaging :

- Update menus to identify foods containing allergens
- Contact supplier or manufacturer to replace damaged or contaminated packaging material
- Revise cleaning and sanitising procedures if these are inadequate
- Throw out food that has been contaminated by packaging or during packaging process
- Recall incorrectly labelled products or possibly contaminated products that have been distributed

  Food Safety Supervisors should ensure that labels contain information about the ingredients included in the product packaging. Ingredient labelling is particularly important for persons suffering from food allergies.

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:** choose the best answer for the following question

1 which of the following is Packaging Systems (2 point)

A. good packaging B. types of packages like plastic containers C. tank D. all

Test II: Short Answer Questions

1. List check lists that packaging suppliers should be used? (4 points)
2. Mention types of materials that to be used in packaging? (4 points)
3. Write types of packaging? (4 points)

Note: **Satisfactory rating - ≥7points** **Unsatisfactory - below 7points**

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

Information Sheet 5 Identifying, rectifying and reported out of specification

5.1 Identifying, rectifying and reported out of specification

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 an out of specifications (OOS) has arrived, a root cause analysis has to be performed to investigate the cause for OOS. The reasons for OOS can be classified as assignable and non-assignable. When the limits are not in specified limits called out of specifications. When OOS has occurred, the analyst should inform to quality control (QC) manager.

Each out of specification will be identified with a unique identification number.
E.g.: OOS/RM-001/2020.
Where, OOS out of specification
RM -raw material (department)
001 -OOS for that year 2020Year.

5.1.1 Rectifying out-of-specification process outcomes

At its core, problem solving is a methodical four-step process. You may even recall these steps from when you were first introduced to the Scientific Method.

- First, you must define out-of-specification process outcomes. What is its cause? What are the signs there's a problem at all?
- Second, you identify various options for solutions. What are some good ideas to solve this?
- Third, evaluate your options and choose from among them. What is the best option to solve the problem? What's the easiest option? How should you prioritize?

- Finally, implement the chosen solution. Does it solve out-of-specification process outcomes? Is there another option you need to try?

The OOS investigation involves 2 phases.

5.1.1 Phase I: (laboratory investigation)

The purpose of the laboratory investigation is to identify the cause for OOS result. The reason for the OOS may be defect in measurement process or in manufacturing process. Irrespective of the rejection of batches, the OOS results must investigate for their trend. The investigation can be done to only those batches that are resulted in OOS, or also to other batches and even other products associated with OOS. The OOS investigation should be thorough, timely, unbiased, well documented and scientifically sound.

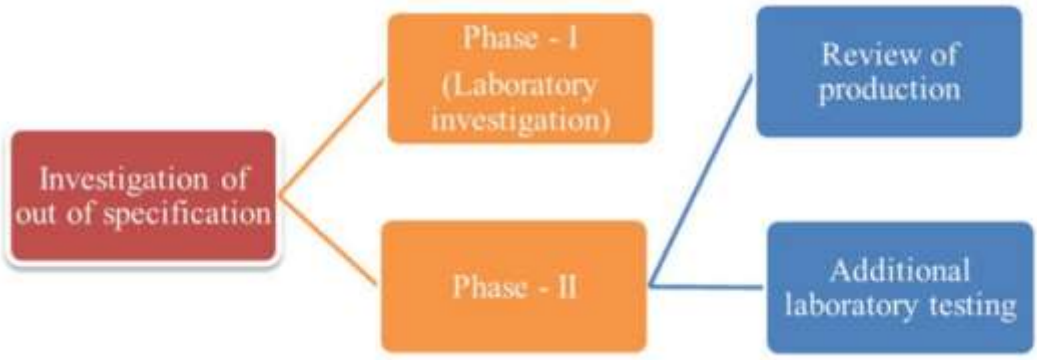

Figure 6 investigation of out of specification result

5.2.1 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.

5.3 Reporting out of specification packaging

out of specification report details of each even in the time range, including the Setup, shape, Instructions, Facility, size of packing or Service, and Customer. Rejection of packaging material due to online unacceptability packaging material Miscellaneous item, Results observed due to incomplete analysis where results are no derived.

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: **Say true or false**

1. out of specification report not recommended.(2point)

2 The purpose of the laboratory investigation is to identify the cause for OOS result (2point)

Test II: Short Answer Questions

1. Define the term out of specification out comes? (5 points)
2. Explain two phases of out of specification out comes? (5 points)

Note: **Satisfactory rating -≥ 7 points** **Unsatisfactory - below 7 points**

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

Information Sheet 6	Maintaining work area

6.1 Maintaining work area of packaging

Maintaining the work area cleanness is playing the vital role of the organizational success. It includes keeping work areas neat and orderly; maintaining halls and floors free of slip and trip hazards; and removing of waste materials (e.g., paper, cardboard) and other fire hazards from work areas. It also requires paying attention to important details such as the layout of the whole workplace, aisle marking, the adequacy of storage facilities, and maintenance. Good housekeeping is also a basic part of accident and fire prevention.

6.1.1. workstation must available

- **Lighting**

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

- **Air Quality**

Workplace are to be adequately ventilated which includes provision of fresh, clean air drawn from outside the workplace, uncontaminated from flues or other outlets and be circulated through the workplace.

Workplace inside buildings may have natural ventilation, mechanical ventilation or air conditioning.

An air-conditioning system should:

- Provide a comfortable environment in relation to air temperature, humidity and 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
- 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.

6.2 Entry and Exit

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

In particular:

- Entries and exits should be slip resistant under wet and dry conditions
- Any walkways, boundaries or pathways shall be marked with 50mm wide with a contrasting color e.g. white or yellow
- Open sides of staircases should be guarded with an upper rail at 900mm or higher and a lower rail
- 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 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.

6.3 Work Areas

The layout of the work area should be designed to provide sufficient clear space between machines, 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
- The equipment to be handled and the personal protective equipment that may be worn to perform the work.
- Environmental factors including heat or noise may require an increase to the space, as will work activities that involve manual tasks or the use of equipment.

- **Workstations**

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, otherwise a footrest shall be provided
- Allows adequate space for leg clearance and freedom of movement
- Is 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 utilizing a five-point-base
- Chairs shall be fitted with castors for carpeted surfaces and glides or braked castors on hard surfaces.

The following are the 5s kaizen to maintain the work area of packaging.

Sort

- Make work easier by eliminating obstacles.
- Reduce chances of being disturbed with unnecessary items.
- Evaluate necessary items with regard to cost or other factors.
- Remove all parts or tools that are not in use.
- Segregate unwanted material from the workplace.
- Define Red-Tag area to place unnecessary items that cannot immediately be disposed of. Dispose of these items when possible.
- Need fully skilled supervisor for checking on a regular basis.

BEFORE

Fig 1 disordered

AFTER

Fig 2 correct order

Set in order

- Arrange all necessary items so that they can be easily selected for use.
- Prevent loss and waste of time by arranging work station in such a way that all tooling / equipment is in close proximity.
- Make it easy to find and pick up necessary items.
- Ensure first-in-first-out FIFO basis.
- Make workflow smooth and easy.
- All of the above work should be done on a regular basis.
- Place components according to their uses, with the frequently used components being nearest to the work place.

Fig 3set in order

Shine/Sweeping

- Clean your workplace on daily basis completely or set cleaning frequency time to time
- Use cleaning as inspection.
- Prevent machinery and equipment deterioration.
- Keep workplace safe and easy to work.

Fig 4 shine

Standardize

- Standardize the best practices in the work area.
- Maintain high standards in workplace organization at all times.
- Everything in its right place.
- Every process has a standard.
- Standardize color coding of usable items
- People know the process of that specific job

Sustain

- Not harmful to anyone.
- Also translates as "do without being told".
- Perform regular audits.
- Training and discipline.
- Training is goal-oriented process. Its resulting feedback is necessary monthly.
- Self-discipline
- To maintain proper order, ensure all defined standards are being implemented and heard.
- Follow the process, but also be open to improvement

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: choose the best answer for the following question

1 which one is training and discipline (2 point)

A sorting B Standardize C Sustain D shine

2 One is the following should be designed for comfortable (2 point)

A workstation B layout C Standardize D none of the above

Test II: Short Answer Questions

1. Mention welfare facilities should be fulfilled in the work area? (3 points)
2. What are the requirements a person should ensure during conducting work in accordance with workplace guideline? (2 pts)
3. Write at list five items that a work environment, facilities and amenities are provided for basic health and welfare of employees, contractors and visitors? (3pts)

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

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

Information Sheet- 7 Conducting work area

7.1 Conducting work area

Having a safe and healthy physical work environment, including amenities and facilities, is critical to eliminating and controlling risk in the workplace. This includes ensuring the work environment, facilities and amenities are compliant with legislative and other identified requirements.

7.2 Conducting work in accordance with workplace guideline

A safe work environment including:

- Facilities,
- Amenities and accommodation.

Facilities refer to toilets, washrooms, showers, lockers, dining areas, drinking water, etc. These facilities must be in good working order, clean, safe and accessible. When considering how to provide and maintain facilities that are adequate and accessible, a person conducting a business or undertaking must consider all relevant matters including:

- The nature of the work being carried out at the workplace
- The nature of the hazards at the workplace
- The size, location and nature of the workplace
- The number and composition of the workers at the workplace.

During Conducting work in accordance with workplace guideline a person should ensure the following requirements.

- Legislative Requirements
- Responsibilities
- Need assessment
- work environment

7.3 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 allows, and the workplace is maintained so as to allow, for persons to enter and exit and to move about without risk to health and safety, both under normal working conditions and in an emergency,
- Work areas have space for work to be carried out without risk to health and safety,,
- **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,

7.4 Responsibilities

7.4.1 Facilities Management Division (or Equivalent)

The Facilities Management Division (FMD) is responsible for ensuring that workplace amenities and facilities:

- Are designed and installed according to company legislative and requirements
- Are inspected and maintained to ensure a safe level of hygiene.

7.4.2 Company Management and Supervisors

Management and supervisors of faculties, divisions and units are to ensure that amenities and facilities in the workplace do not expose workers, or visitors to health and safety risks.

This includes:

- Ensure, so far as is reasonably practicable, that the layout of the workplace, lighting and ventilation enables workers to carry out work without risks to health and safety
- Ensure, so far as is reasonably practicable, the provision of adequate facilities for workers, including toilets, drinking water, washing and eating facilities
- Manage risks associated with remote and isolated work

7.4.3 Employees

Employees are responsible for reporting any identified hazard in the work environment, facilities or Amenities that they become aware of in accordance with factory or company guidelines.

7.4.4 Nature of Work Performed

The requirements of amenities and facilities will depend on the type of work being performed and the equipment being used. For example, persons handling chemicals or conducting hot and arduous activities may need to access shower and change room facilities. Persons working remotely may require shelter sheds, food and water.

7.4.5 Size and Location of the Work Area

Consideration should be given to the location such as the work area being in a building, remote area or outdoors. The work area may be multiple locations/sites over an extensive area. The workplace may not be in proximity to physical amenities.

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 I: say true or false

1. Each worker to carry out work without risk to health and safety. (3point)
2. Safe work environment including Facilities and amenities. (3point)

Test 2: Short Answer Questions

i. Write things fulfilled in a safe working environment? (4 points)

ii. Write work place requirements that the worker should be ensure when conducting the work? (4 points)

iii. What are legislative requirements? (4 points)

Note: **Satisfactory rating -≥ 9 points** **Unsatisfactory - below 9points**

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

Information Sheet- 8 maintaining workplace records

8.1 maintaining workplace records

There are certain written records or kinds of documentation that are needed in order to verify that the system is working. These records will normally involve the Implementing Hazard Analysis and Critical Control Point (HACCP) plan itself and any monitoring, corrective action, or calibration records produced in the operation of the Hazard Analysis and Critical Control Point (HACCP) system. Verification records may also be included. Records maintained in a HACCP system serve to document that an ongoing, effective system is in place. Record keeping should be as simple as possible in order to make it more likely that employees will have the time to keep the records.

8.2 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. Records can also help you improve your preventive control plan by providing a means for you to, for example:

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

The following makeup of the records of a Hazard Analysis and Critical Control Point (HACCP) Plan

- List of HACCP team and their assigned responsibilities
- Description of each menu item
- Flow diagram for each menu item indicating CCPs
- Hazards associated with each CCP and preventive measures
- Critical limits

- Monitoring procedures
- Corrective actions plans
- Record keeping procedures
- Procedures for verification of the HACCP plan

- Production process
- Variation of results

8.3 workplace record system

Most organisations store their records electronically (on a computer) and in paper form (hard copy). Some also keep

Image-based records. Image-based records can be stored on:

- computer
- CD or DVD (computer records transferred to a disk)
- Microfilm or microfiche, where copies of records are transferred to a plastic film that can be accessed via special viewer.

➢ **Paper-based records**

- Examples of paper-based records include:
- reports
- magazines,
- journals and newspapers
- project files
- contracts
- minutes of meetings
- business letters
- email messages and memos
- faxes
- forms
- diaries and other note-taking method

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 I: choose the best answer for the following question

1 which of the following is paper-based records? (2point)

A computer B CD/ DVD C business letter D microfilm

Test I: Short Answer Questions

1. Makeup hazard analysis and critical control point plan includes? (5 points)
2. Write the purpose of recording? (5 points)

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

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

Information sheet 9 Conducting work in a accordance with workplace requirement

9.1 Conducting work in accordance with workplace requirement

The importance of conducting workplace requirements are:

- Minimization of waste, through implementation of the waste management hierarchy
- Efficient and effective use of energy and other resources
- seeking alternative sources of energy
- efficient use of materials and appropriate disposal of waste
- use of controls to minimize the risk of environmental damage from hazardous substances
- reducing emissions

9.2. Benefits of Waste Minimization

While it is obvious that waste minimization supports sound business and economic practices in addition to protecting the environment, other benefits include the following:

- **Improved product quality** – New technological practices and innovation will not only reduce generation of waste but also contribute to improved input quality that translates to improved products.
- **Economic benefits** – Efficiency in product use translates to reduced costs when purchasing materials thus significantly affecting financial performance.
- **Efficiency of production practices** – Waste minimization will attain more output of the product for every part of raw material.
- **Environmental responsibility** – eliminating or minimizing generation of waste will make it easy for you to achieve environmental policies, standards and regulations.

- **Public image** –Embracing waste minimization will boost the reputation of your company, as it is a reflection of proactive movement in the quest to protect the environment.

9.3. Waste Minimization Techniques

- ***Optimization of resources***

In order to reduce the quantity of waste that is produced by individuals or organizations calls for the optimization of raw materials used in production. For instance, a dressmaker will do well to arrange the pieces of pattern in a certain way along the length of the fabric to use a small portion of the fabric.

- ***Scrap metal reuse***

Incorporating scraps into the initial stages of manufacturing is a surefire way of ensuring that they do not end up in landfills as waste products. A majority of industries embrace this process effectively returning rolls that are damaged to the initial production line and in the manufacturing of off cuts, plastic items so that scrap is re-incorporated in the new commodities.

- ***Quality control improvement and process monitoring***

Measures can be put in place to control the number of rejects and ensure it is at a minimum. This may be achieved through increased frequency of inspection as well as increasing the number of inspection points. For instance, installation of continuous monitoring device that is automated will help in identifying production problems before they get to an advanced stage.

- ***Exchange of Waste***

Here, the waste products from one process are used as raw materials for other processes. Exchange of waste is another means of minimizing waste disposal volumes especially for waste that may not be eliminated.

- ***Shipping to the point of use***

Here, raw materials as well as other components are directly delivered at the point of assembly or manufacturing plant ostensibly to minimize handling and use of enclosures and protective wrappings.

- ***Zero waste***

- This systems approach is designed to eliminate waste from the source as well as at every point the supply chain to ensure that no waste is produced

Fig 1 eliminate waste

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. Explain Benefits of Waste Minimization? (5 points)
2. Mention Waste Minimization Techniques? (5 points**)**
3. Write at least 3 points of workplace environmental guidelines? (2point)

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

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

LG #83	LO3: Shut down the process

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Identifying shutdown procedure • Shutting down the Process • 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 Process • 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

Normal shutdown includes steps to render the systems safe, such as removal of hazardous process materials and inert (asphyxiating) gases. The systems might be cleaned as part of the shutdown; cleaning is often a process unto itself requiring its own set of startup, operation, and shutdown procedures.

1.2 The types of shutdowns

- Scheduled shutdown
- Maintenance shutdown
- Emergency shutdown
- Trips
- Shut down to a stand by condition.

1.2.1 Scheduled shutdown

A scheduled shutdown is initiated by the operator during normal operation of the unit when:

- Maintenance is required or
- Feed supply is low or exhausted.

The shutdown procedure will depend on the type of equipment and the process chemistry.

Some steps taken in a unit shutdown may include:

- Shutting off the feeds to stop processes and heat generation particularly if processes are exothermic (produce heat)
- Re-circulating feeds from supply tanks so they do not enter the unit
- Shutting off heating or cooling to the unit or feed preheat system
- Shutting off mixing and other mechanical operations
- Cooling and flushing materials from the unit

1.5.4 Maintenance shutdown

When maintenance to the unit equipment is required, the equipment may need to be entered so that work can take place. The shutdown should be a scheduled or planned shutdown as per Standard Operating Procedures where equipment is:

- Isolated (process, mechanical and electrical)
- Cooled and depressurized
- Purged and gas freed
- Cleaned
- Gas tested on a continuous basis prior to and during entry.

A planned unit shutdown will prevent:

- Plugging of lines or equipment
- Possible damage to equipment
- Possible injury.

1.2.2 Emergency shutdown

An emergency shutdown is initiated in the event of a fire, major spill, instrument failure, power failure, or total loss of control of chemical or physical processes. Emergency shutdown procedures must be followed during a shutdown sequence.

1.2.3 Trips

Shutdown of a unit can be initiated by the automatic shutdown system. The systems may be shut down automatically because of temperatures, fluid levels, pressures or flows that are above or below trip points. Typical shutdowns initiated by trips may include.

- Low liquid level in a vessel
- High liquid level in a storage tank
- High viscosity causing increased load on pumping or mixing equipment
- Mixer failure
- Pressure to high
- Temperature to high
- Low feed flows

1.2.4 Shutting down to a stand by condition

When a unit is to be shut down for a short period of time for maintenance on auxiliary equipment, the unit is shut down to a standby condition. A stand by shutdown allows a quick startup of the unit after maintenance is completed in order to minimize lost production time and off spec material. Standard Operating Procedures must be referred to when shutting down each type of unit to a stand by condition.

A typical stand by condition may include:

- Re-circulating material upstream and downstream
- Reduced heating or cooling (sufficient to maintain a safe process condition)
- Slow-rolling compressors
- Venting process gases to flare Diverting

1.3.2 The following points are shutdown procedure during cleaning packaging components

- Equipment is dried and cleaned as per manufacturer's specifications and infection control procedures.
- Cleaning agents, polishes and cloths are stored in accordance with manufacturer's specifications and relevant health and safety requirements
- Cleaned equipment is stored in a manner that will maintain its function and is readily accessible for re-use

1.4.3 Cleaning packaging machine includes

a) Re-operational checks

b) Start-up

c) Shut down and minor servicing to enterprise requirements.

- Process streams to temporary storage.

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 choose the best answer for the following question (each 3 point)

1 which one is planned unit shutdown will prevent?

A shutdown B Possible injury C cleaning D all

2 One is true about shutdown process?(3point)

A shutdown is render system B material C shut down is the process of closing D all E a& c

Test I: Short Answer Questions

1. What is shut down process? (5 points)
2. Write down steps of shutdown? (5 points)
3. Explain emergency shut down? (5point)
4. Write steps taken in unit shut down of schedule shut down? (5 points)

Note: **Satisfactory rating -≥ 13 points Unsatisfactory - below 13 points**

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

Information Sheet-2 Shutting down the Process

2.1 Introduction

The point of a shutdown is to create a plan for a complete cessation of all plant activities in order to perform necessary maintenance, repairs, equipment replacements, and to perform internal maintenance. The shut-down procedure is just as important as the 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. Shut down the line can have a major impact on your capacity to restart production promptly. In an upcoming article, we will help you restart your machinery, taking the best steps and precautions.

The Steps to follow for proper shutdown of manufacturing line:

A. End of production sequence

When pausing a manufacturing line, it is crucial to allow the machine to empty itself of all the components. The end of the production sequence clears the manufacturing equipment without loading new products into the cycle. This cycle finishes components in a machine and automatically removes most of the glue, parts, liquid, and powder from the production path.

There are, however, certain elements that will not be automatically emptied until a later stage of the manufacturing processes. It may be necessary to remove these elements manually and thus completely empty the machine of any stray material that can complicate startup. This first step is crucial. For instance, we had experience with a temporary equipment shutdown where cookies was left inside certain containers..

Fig.1 shutdown

B. Air purge

Once the machine is out of service, the next thing we recommend is to purge any air that may be present in the equipment. Machines often use compressed air to activate the different cylinders, and most machines have an air purge valve that allows for bleeding off any accumulated air. Why is it important? Because the air can crystallize and eventually wear out pneumatic components.

C. Cleaning of the machine

Beyond clearing the line of product and residue, purging air, and cleaning filters, you should take the time to clean the machinery thoroughly during shutdown. Cleaning now will avoid unpleasant surprises at startup. For example, in the previous example where a company left cookies in their system, which froze, cleaning it was longer and more complex than just emptying it. During cleaning, they had to dismantle pipes and small components, resulting in broken parts because it was so “jammed”. It added an extra layer of unnecessary work and problems. Invest the time today, and you’ll save time in the long run.

D. Preventive maintenance

Whether the shutdown affects all of your manufacturing lines or just a portion, we recommend you use the disruption as an opportunity to perform preventive maintenance on your equipment. The manufacturer's operation and maintenance manual is the best source for guidance on how to care for your equipment and how to identify issues that need repair. Dealing with repair needs today will help you to be better able to restart quickly. It is also advisable to ensure that you have critical parts and components that need frequent replacement beforehand.

E. Environmental

More generally, we suggest that you keep the equipment in a stable environment, adequate in terms of temperature and ventilation. This will help avoid degrading your production Level similar to that during production. However, keeping the temperature and humidity level stable is important so that the machine does not start to rust. As for air compressors especially air dryers and filters we highly recommend that you change these components at shutdown so there will be no contamination or blockage of filters. If you have just recently replaced filters, then you may not need to change to new filters at the time of the shutdown process. The main goal here is to avoid letting your machinery be dormant with dirty filters in place, as this could adversely affect the general functioning of your machine.

F. Protection

When your equipment is in an industrial environment, certain activities such as cutting materials, welding, generate dust and debris. This poses the risk of generating contaminants and damaging all that is mechanical, such as seals. Accumulated metal shavings, for example, can cause internal damage and pose a risk to operators when the machine is switched back on after the shutdown period. Normally, when the fans in the factory are running, dust or contaminants are filtered. At Orientech, when a machine is on physical hold at the customer's request, we always cover it with plastic wrap to protect the machine and fragile components from contaminants. This simple step can save you from these problems at restart.

G. Electricity

We highly recommend you to start by making a backup of all of machines. There is a very specific procedure to change the batteries of robotics to ensure that programming does not get lost or altered. When you have backed up everything and replaced the parts and batteries that are needed, you should determine if you should cut off the power source, or maintain power during shutdown. It may be preferable to

cut off the power to avoid any power surge. Electrical components must also be protected during dormancy. If there is dust, contaminants, cookies.

- **Get support**

In case you are not comfortable with restarting, or if you have any questions, please do not hesitate to contact your partner company. You may even be able to ask them to reboot with you, online, video or phone. This crisis is unprecedented. Many factors are out of your hands, such as the duration of a shutdown period. It is key to focus on what you actually can control. The approach to maintaining your machine, assembly lines, and manufacturing premises, is something you have the ability to actively manage.

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 say true or false for the following

1 The shut-down procedure is as important. (2 point)

Test I: Short Answer Questions

1. What is shut down process? (5 points)
2. Write down Steps to follow for proper shutdown? (5 points)
3. Write the main goal of shut down process?(4point)

Note: **Satisfactory rating - ≥8 points** **Unsatisfactory - below 8 point**

Information Sheet 3- Identifying and reporting maintenance requirements

3.1 Identifying and reporting maintenance requirements

Maintenance can be defined as working on something to keep it in a functioning and safe state and preserving it from failure or decline. Maintenance procedures are written instructions that, when followed by the maintenance personnel, will ensure that equipment operates as designed within safe operating limits.

Maintenance may include:

- Sharpening the cutter
- cleaning,
- lubricating,
- Tightening
- Simple tool repairs and adjustments.

3.2 Types of maintenance

- **Preventive or proactive maintenance**: is carried out to keep something functional. This type of activity is usually planned and scheduled.
- **Corrective or reactive maintenance:** is repairing something to get it working again. This is an unscheduled, unplanned task, usually associated with greater hazards and higher risk levels.

3.3 Routine maintenance tasks

Routine maintenance tasks refer to:

On-going scheduled tasks that are performed in order to keep hand tools and basic equipment functioning properly.

It could include tasks such as

- unblocking pipes and nozzles,
- sharpening blunt tools,
- cleaning nozzles on sprayers,
- checking, cables and plugs

Some tips on routine maintenance:

- Use the correct tool for the job.
- Keep tools in good condition.
- Handles should be tight and free from defect.
- Cutting tools should be kept sharp.
- Use and maintain power tools according to their operator instructions.
- Make sure power tools are properly grounded or are double insulated.
- Switch off and unplug power tools before changing blades or servicing and repairing.
- Wear clothing that is free of strings or loose ends that could catch.
- Wear appropriate personal protective equipment (PPE), such as glasses, dust face masks, shields, hearing protection, etc.
- Keep all guards and shields in place.
- Unplug and store tools after use.
- Consider keeping power tools locked up to prevent unauthorized use.

Table.1 maintenance check list

	Tool	Yes	No	Remark
1	Are tools in safe condition?			
2	Are instruction manuals available?			
3	Are power tools properly grounded?			
4	Are guards and shields in place?			
5	Is Personal Protective Equipment available?			
6	Are tools properly stored?			

If necessary:

- Unblock pipes and nozzles.
- Sharpen blunt tools.
- Clean nozzles on sprayers.
- Check and maintain cables and plugs.

- **Reporting faults and problems**: **maintenance**

Every work shop has a different maintenance schedule and it is important that you are familiar with the schedule implemented on the work shop where you work.
There will usually be a routine schedule for particular tools that states how often maintenance checks have to be performed. These will also specify the checks that have to be performed. Some tools may require daily checks and maintenance after use. Other tools, such as power tools, usually must be checked once in 6 months or so. More complicated power tools would need to be serviced on a regular interval; refer to the operation manual.

A maintenance schedule assigns a specific date to specific maintenance tasks. It states what has to be checked and will require that the assigned person signs off the document assuring that the checks were done. If faults are found, the tool must be sent for maintenance and the assigned person that fixes the tool has to report on exactly what was done and when it was completed.

An example of checklist is for how to fill or document maintenance required and report performed maintenance is given below**.**

Table.2 maintenance schedule

Date	**Tool**	**Maintenance check points**	**Signature**	**Maintenance required**	**Signature**
10/2/2013	Ice cream machine	Plug		Plug	

Maintenance Performed	Date	**Signature**
Ice cream machine		

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 1 choose the best answer for the following question

1 which of the following is types of maintenance (2point)

A maintenance schedule B Preventive maintenance C none D all

Test: I Short answer questions

1. List at list five points in some tips on routine maintenance. (2pts)
2. Define the two types of maintenance (2pts)
3. How do we/you perform maintenance safely? (5pts)
4. Define maintenance and write what maintenance may include. (3pts)

Note: **Satisfactory rating –≥ 7 points Unsatisfactory - below 7 points**

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

Operation Sheet 1	shutdown procedure

Procedures:

Step1. Apply Safety first

Step2. Follow appropriate shutdown procedure

Step3. Select tools and equipment for cleaning (using water/cleaning agent)

Step4. Identify shut down process

Step5. Observe Lock out Tag out procedure

Step6 .Check which systems be isolated or shut down

Step7 Check all switches to see that they are off before plugging into the outlet.

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The trainers who developed the TTLM

No	Name	Qualification	Educational background	Region	E-mail
1	Teshale Besufikad	B	Food science and post-Harvest Technology	Hawasa	teshu44@gmail.com
2	Memiru Michael	B	Food Process Engineering	A.A	Lijelshaday@gmail.com
3	Zerfu Negash	B	Hotel mgmt.	Oromia	nzerfu@gmail.com
4	Meseret Niguse	B	Hotel & Tourism mgt	Oromia	mimimesi@gmail.com
5	Cheru petros	B	Food technology and process engineering	SNNPR	Chupeter143@gmail.com
6	Zelalem Taye	A	Leadership and Management	Amhara TVEDB/coordinator	Tayezelalem22”gmail.com