

DAIRY PRODUCTS PROCESSING

Level II



Based on September, 2021, Version 1

Occupational Standards

**Module Title: Operating a Fill, Seal and can
Process**

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Introduction to the Module

This module covers the knowledge, skills and attitudes required to Prepare the filling, sealing equipment, canning process and Shut down the filling and sealing process

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LG #39

LO #1- Prepare the filling and sealing equipment and the canning process for operation

Instruction sheet

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

- Confirming and making available materials and packaging components
- Identifying and confirming cleaning and maintenance requirements.
- Fitting and adjusting machine components
- Entering operating parameters
- Checking and adjusting equipment performance.
- Carrying out pre-start checks.
- Checking and confirming required services for production

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

- Confirm and make available materials and packaging components
- Identify and confirm cleaning and maintenance requirements.
- Fit and adjust machine components
- Enter operating parameters
- Check and adjust equipment performance.
- Carry out pre-start checks.
- Check and confirm required services for production

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

1.1 Confirming and making available materials and packaging components

1.1.1 Introduction to packaging

Packaging is the enclosure of products, items, or packages in a wrapped pouch, bag, box, cup, tray, can, tube, bottle, or other container to perform the following functions: containment; protection or preservation; communication; and utility or performance. If the device or container performs one or more of these functions, it is considered a package.

The type of packaging material for dairy products is of critical importance because of its impact on quality, safety, cost, and marketing of the commodities to consumers.

Recently, there are numerous materials available for the packaging of dairy products. Dairy product packaging material includes glass and plastic bottles, various cartons, pouches (bag), cans, plastic tubs, and other containers.

Packaging has the following functions include;

- **Containment** (to facilitate handling and holding the product)
- **Protection** (Quality, Safety, Freshness, protect the product from contamination)
- **Means of minimizing costs**
- **Medium of communication** (Labels)

Package can convey to the consumer the following information;

- ✓ Proper storage conditions
- ✓ Size and number of servings or portions per pack
- ✓ Nutritional information per serving
- ✓ Manufacturer's name and address, etc.

1.1.2 Good packaging materials fulfill:

- **Recyclable**

In general, recyclable materials are those that can be used again after undergoing a chemical treatment and process. Many items that we use in our everyday lives that are often thrown away can instead be recycled and used to create a new product or packaging material.

Paper, cardboard, glass, aluminum, and certain types of plastic are commonly recyclable and can be collected, processed, and sold as raw material.

- **Renewable**

Renewable materials refer to those that have components that are bio-based and can be naturally renewed.

- **Compostable or Degradable**

Compostable materials are those that are capable of breaking down to their elemental parts technically, everything will degrade eventually. The key difference is the amount of time that is required.

- **Packaging material criteria**

Good packaging materials should fulfill the following criteria;

- ✓ Process ability)
- ✓ Resistance ability
- ✓ Absorbency/ low permeability or penetrability

1.1.3 There are different types of package materials include;

- **Paper and paperboard**

Paper and paperboard represent the packaging material used by far in largest volume around the world. Because of its origins, it must be combined with other materials to render it effective in packaging applications.



Figure 1.1. Paper and paperboard packaging

- **Metal**

Metal is most often used for cylindrical cans which are either thermally processed for Microbiological stability or internally pressurized with carbon dioxide as for beer and carbonated beverages.



Figure1.2: Metal packaging

- **Glass**

Glass is historically the oldest packaging material still in use. Glass is the best barrier and by far the most inert to product contents. Further, in appropriate structures, glass has the greatest vertical compressive strength.



Fig 1.3. Glass packaging

- **Plastic packaging**

Plastic is the newest packaging material, having been developed in the twentieth century. The most commonly used packaging plastic is polyethylene which may be obtained in high, medium, and low densities, with variations available on each of these.

- ✓ **Low density poly ethylene (LDPE):** is tough, flexible, easily formed, and light weight. It is an excellent water and water vapor barrier, but a poor oxygen barrier. LDPE's most common uses are as flexible pouches and bags, and as the heat sealable extrusion coatings on paper, paperboard, aluminum foil, and other plastics.

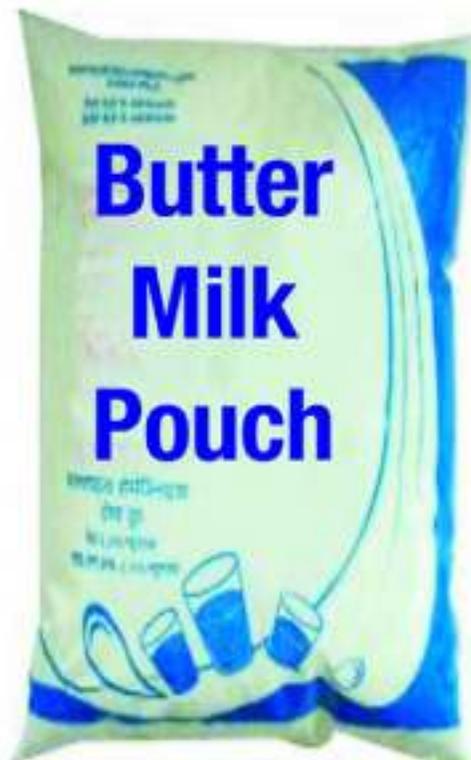


Figure 1.4. Low density poly ethylene

- ✓ **High-density polyethylene (HDPE):** is a semi rigid, somewhat stiff translucent easily formable Plastic. With fairly good heat resistance (for a plastic), HDPE has excellent moisture and water resistance, but very poor gas barrier. HDPE is used to form bottles for milk and drinkable yogurt as well as a wide variety of other products with modest barrier requirements.



Figure 1.5 high density poly ethylene

1.1.4 Packaging components

There are different components or forms of packaging based on the packaging material.

- **Primary packaging:** is the material that first envelops the product and holds it. This usually is the smallest unit of distribution or use and is the package which is in direct contact with the contents. It envelops and holds the food product.
- **Secondary packaging:** is outside the primary packaging perhaps used to group primary packages together. It is exterior to the primary packaging.

- **Tertiary packaging:** is used for bulk handling, warehouse storage and transport shipping. The most common form is a palletized unit load that packs tightly into containers. It is the tough outermost covering that is used for bulk handling, warehouse storage and transport / shipping.

Table 1. Advantage and disadvantage of packaging material

Types of packaging materials			
Paperboard	Glass	Metal/Steel	Plastics
<u>Advantage</u>			
Easily folded	Product visibility	Strong, stiff	Economically benefit
Easy to recyclable	Strong , inert material	Good barrier	Variety of forms
Lightweight	Reuse opportunity	Returnable	Light weight
<u>Dis advantage</u>			
Chances of water Absorption	Easy to breakable Shatters,	Rusts	Thermal limit
Penetrable	High weight	Limits shapes	Permeable
Image scratch	Limited shapes	Appearance	Absorbs flavors
Tears, punctures	Large sizes	Flavor distortion	React with food

1.1.5 Filling in packaging material

Filling Solid foods are either in the form of large pieces or particles that flow like liquids. At a small scale of operation, large pieces are usually packed by hand whereas powders and small particulate foods can often be filled using similar fillers to those used for liquids. Z

The selection of suitable filling operation equipment depends on the:

- Viscosity,
- Temperature,
- Particle size and
- Foaming characteristics of the product, and the production rate required.

1.1.5.1 Filling thin liquids

A liquid packaging machine, also known as a flow filling machine, is used to fill products with different liquid viscosities into various container types either through the volumetric or quantitative filling. They can handle liquid products ranging from water-like to heavy-viscous and extremely thick ones.

No single type of liquid filler can simultaneously handle all kinds of liquids you see in different packaging industries.

Just like any packaging machine, liquid fillers are important in the manufacturing industry for promoting the efficiency and quality of the products being processed.

Filling liquid /access date Nov, 19 <https://www.youtube.com/watch?v=sTjwbN1I1d8>

The appropriate liquid filler depends on

- The liquid viscosity, foam characteristic, and the size of the particulates present in your product
- Chemical compatibility of your product and containers
- The temperature in the packaging environment
- Hazard considerations



Figure 1.6 filling thin liquid

1.1.5.2 Filling powder (particulate)

Machines for filling powders and particulate foods have a hopper that is filled with food, and when the weight of food reaches a pre-set limit, the base of the hopper opens to drop the powder into a container below.



Figure 1.7 Filler of milk powder

1.1.5.3 Filling viscous liquids

Because viscous liquids do not flow easily, a dispenser or piston filler is the preferred option. This equipment is relatively low-cost but has lower production rates than piston fillers.

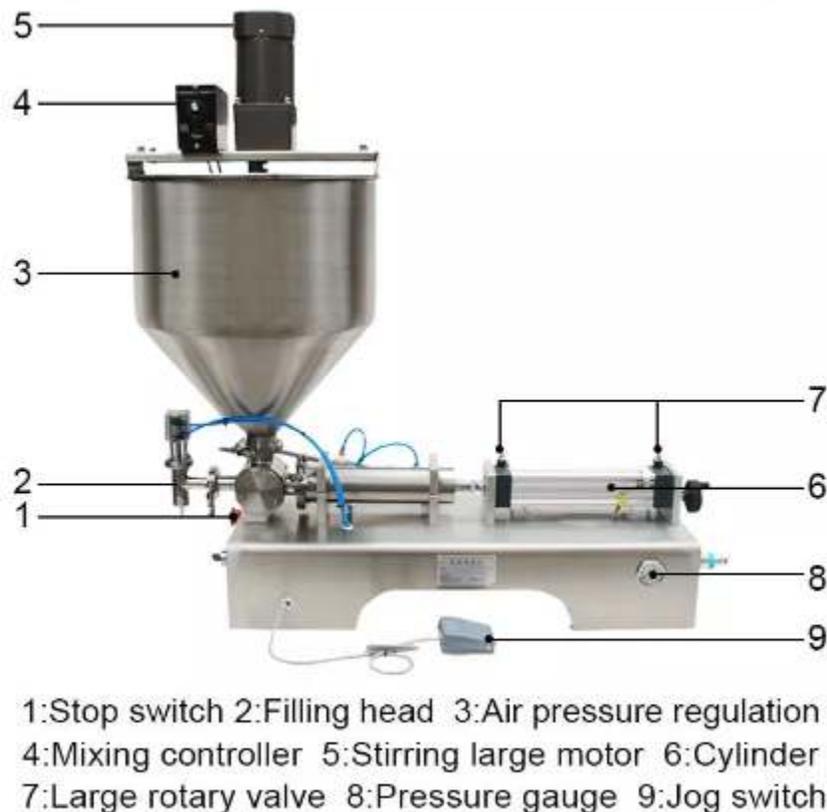


Figure 1.8 Filler for viscous liquids

1.1.6 Sealing

Different types of closures for plastic and glass containers include metal or plastic caps and lids, and foil, plastic or paper covers. In practice the selection of a package and closure depends mostly on their local availability and relative cost.

Plastic films is most plastic films are heat sealed but cold seals or adhesive seals are sometimes used for heat sensitive products e.g. chocolate, chocolate-coated biscuits or ice cream. To seal flexible films, the two surfaces of the film are heated until they partly melt and pressure is used to fuse the films together.

The strength of the seal depends on the temperature, pressure and time of sealing. A better and faster option is to use an electric bar-type heat sealer. If electricity is not available, it is possible to modify the sealer to heat the bar directly with a flame.

Rotary or band sealers are used for higher filling speeds. They have continuous belts that pass the mouth of a sachet or bag between heated rollers, and the two sides of the film are welded together.

Watch video sealing dairy product/ access date Nov. 21/2022

https://www.youtube.com/watch?v=8tuJ6Up_Hlo

1.1.7 Canning process

Canning is the general term applied to the process of packaging a food in a container and subjecting it to a thermal process for the purpose of extending its useful life.

Canning is a method that sterilizes food by heat in airtight containers to achieve a commercially sterilized product, which allows food to be stored at room temperature while maintaining food safety and organoleptic quality for months or even years.

There are two typical forms of canning:

- **In- container sterilization (Retort processing)**

In container sterilized food heats packed product in containers such as metal cans or glass jars using a retort process, such as steam, until the center of the product reaches protocol temperatures for sterilized product. Accordingly, both the package and product are sterilized together. Retort processing can be applied to all types of foods.

- **Out of container sterilization (Aseptic processing)**

Out-of-container sterilized food refers to separate sterilization of food and product and then packing/filling and sealing under specific aseptic conditions. Aseptically processed food is limited to liquid foods.

- **Sterilization process (canned) can be subdivided into three phases:**
 - ✓ **Heating phase:** During the heating phase, water or steam is applied as the heating medium; the temperature of the product is increased from ambient temperature to the required temperature to achieve sterilization. The bottles are passed through a steam chamber and heated to a **113–130 °C** for approximately 10–12 min. They are then rapidly cooled to avoid further thermal degradation.
 - ✓ **Holding phase:** The required temperature is then maintained for a certain time period defined as the holding phase.
 - ✓ **Cooling phase:** During the cooling phase, a cooling medium is introduced, such as air or water, and the temperature of the product decreases.

1.2 Identifying and confirming cleaning and maintenance requirements.

1.2.1 Definition of Cleaning

Cleaning is the complete removal of dirt particles from the surface of machines, tools and equipment 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 in order to maximize product quality and health promotion.

1.2.2 Cleaning objectives

- **Physical cleanliness** – removal of all visible dirt from the surface
- **Chemical cleanliness** – removal not only of all visible dirt but also of microscopic residues that can be detected by taste or smell but are not visible to the naked eye
- **Bacteriological cleanliness** – attained by disinfection
- **Sterile cleanliness** – destruction of all microorganisms

1.2.3 Cleaning Methods

There are various methods which can be used to apply detergents and disinfectants

- **Manual cleaning**

Manual cleaning is practiced 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.

- **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.

- **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 dirt particle.

- **Machine washing (cleaning in place)**

This is normally an automatic or semi-automatic washing process conducted within a purpose built machine.

Cleaning-in-place means that rinsing water and detergent solutions are circulated through tanks, pipes and process lines without the equipment having to be dismantled. CIP can be defined as circulation of cleaning liquids through machines and other equipment in a cleaning circuit.

1.2.4 Available material for clean in place

- Personal protective equipment
- Storage tank for alkaline detergent
- Storage tank for acid detergent
- Ring lines for detergents
- Plate heat exchanger



Figure 1.9 Personal protective close

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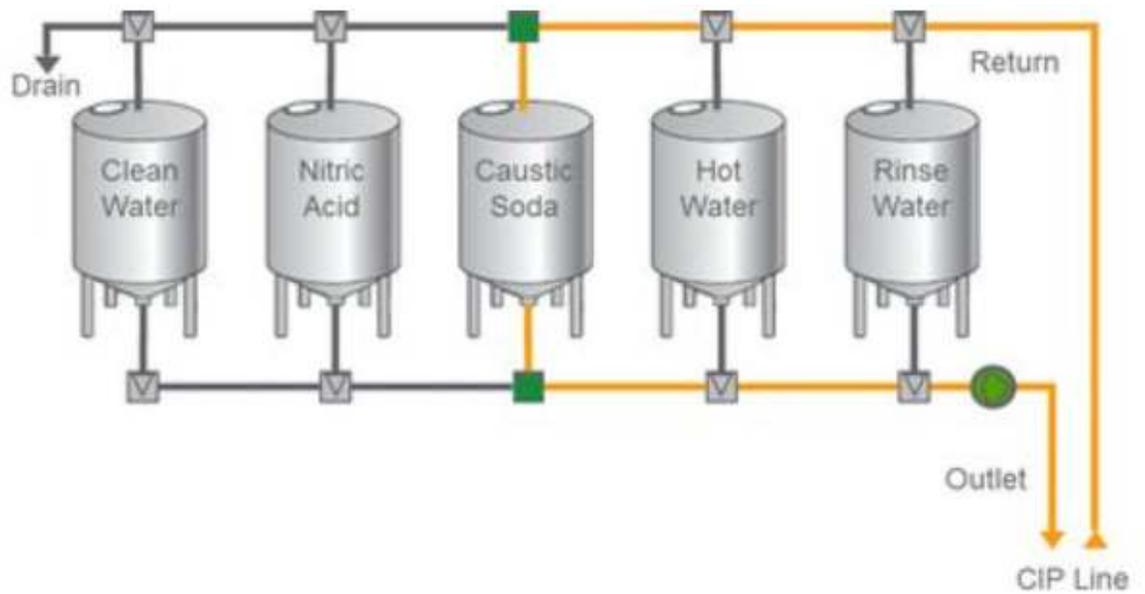


Figure 1.10 Clean in place detergents

CIP process <https://www.youtube.com/watch?v=B1YC6SBGdTU>

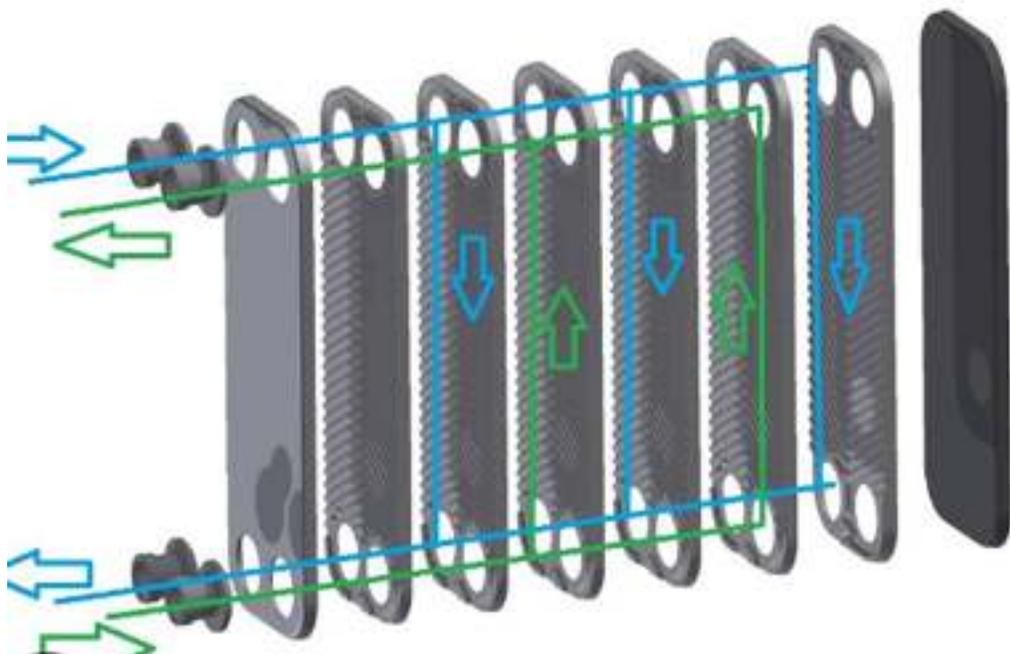


Figure 1.11 plate heat exchanger

1.2.5 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.

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 side effect for workers.

1.3 Fitting and adjusting machine components

1.3.1 Introduction

Tools used in the sectional and straight-line assembly of machines to join components and in adjustment operations.

Fitting and assembly tools used in assembling machine components may be either manual or power driven

1.3.2 Fitting and adjusting vertical packaging machine components

Bag making in theory, all vertical packaging machines work the same. A flat web of film, originating from a large roll of film at the start of the machine, is shaped into a tube. This tube is closed at the bottom: this is the bottom of the new bag. As soon as the product is dispensed into the bag, the top side is also closed. The time and steps that are needed to make one bag are collectively called a machine cycle.

Vertical filling and sealing machines divided into the following four main groups:

- Bulk goods
- Powders, such as dehydrated milk;
- Grains or granulate,
- Liquids

The vertical filling and sealing machine has different components includes the following;

- ✓ **Film holder and roller** (holding packaging materials)
- ✓ **Motor** (the main part of machine to driven machine)
- ✓ **Product receiver** (receive the material from processed area)
- ✓ **Volumetric cup** (adjust the volume filling)
- ✓ **Cutter** (sharp device cutting during sealing process)
- ✓ **Temperature controller** (for adjusting over all temperature)
- ✓ **Sealing Unit** (section of cupping, sealing,)



Figure 1.12: Vertical filling machine



Tools and equipment used for adjusting and fitting machine

- Long nose pliers
 - Needle nose pliers
 - Used for gripping and holding
 - Can reach into narrow areas
 - Work with small parts
- Diagonal side cutting pliers
 - Cutting and stripping wire
 - Can cut thin metal

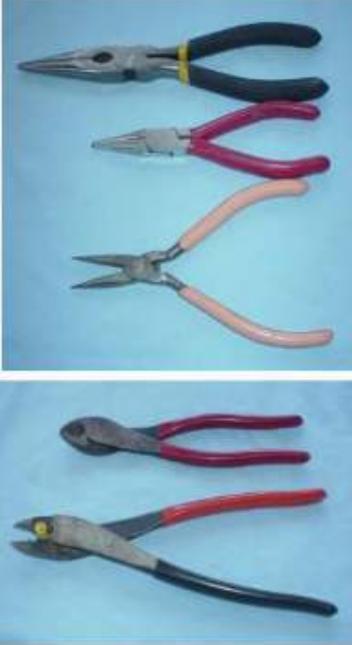


Figure 1.12 A. Hand tools

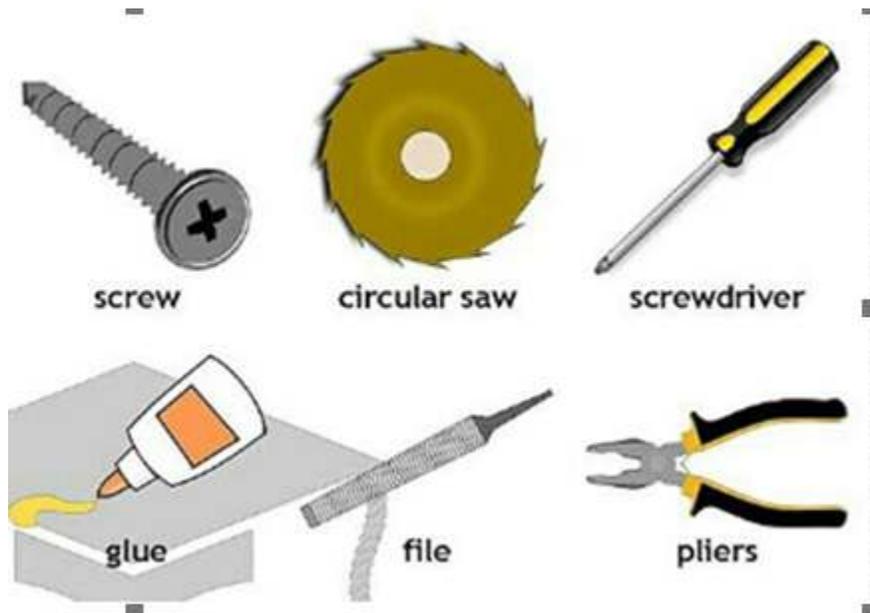


Figure 1.12 B. Hand tools



Figure 1.12 C. Hand tools

Watching video fitting and adjusting <https://www.youtube.com/watch?v=Vm4wQmxN9kA>

1.4 Entering operating parameters

1.4.1 Operation procedure of filling and sealing equipment

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.

Benefit of operation procedure

- 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;

1.4.2 Material safety data sheet

Material safety data control of substances hazardous to health states that general requirements on employers to protect employees and other persons from the hazards of substances used at work.

Plant operatives should have an awareness and understanding of material safety data for raw materials, intermediates, products and effluent / waste;

Material safety data sheet include:

- Control measures and personal protective equipment;
- Location of plant where process to be undertaken;
- Roles and responsibilities of individuals involved in plant operations;
- Plant fit for purpose;
- The condition of main process plant and equipment (clean, empty etc. as appropriate) should be established as being fit for purpose;
- Plant correctly set-up for processing;
- Process monitoring and recording;
- Monitoring and recording of key process parameters (temperature, pressure etc.)
- Quality specification
- Sampling of raw materials, intermediates, products and effluent/waste;
- Packaging of final product.

1.5 Checking and adjusting equipment performance

1.5.1 Checking and adjusting equipment

Overall equipment effectiveness, or, measures the percentage of scheduled production time that is fully productive

The design and construction of equipment and handling milk and milk products should be given adequate consideration for cleaning, disinfecting and preventing food contamination.

The contact surfaces should be made of materials with no toxic effect in the intended use of food. Design of equipment should facilitate easy movement and capability of disassembling to allow maintenance, cleaning, disinfecting, monitoring and inspecting pest. Other important requirement of processing equipment is to withstand processing condition without affecting food safety aspect.

The equipment should have provision and capability for monitoring and control of process parameters. Equipment for waste, by-products and inedible or dangerous substances should have specific identification, safe design and placement at appropriate location. Required safeguard should be made to prevent cross contamination from these containers or their contents.

The nature of the equipment designed and constructed to ensure:

- Contamination is minimized to safe level;
- Permits maintenance, cleaning and disinfections and minimize contamination;
- Surfaces and materials in contact with food are non-toxic.
- Suitable facilities should available for temperature, humidity and other controls; and
- Effective protection against pest access and harborage.

1.5.2 Conduct Checks on Machine/Equipment

Before allowing someone to start using any machine you need should:

- Check that it is complete, with all safeguards fitted, and free from defects.
- Follow manufacturer specification of the machine.
- Produce a safe system of work for using and maintaining the sealing machine.
- Maintenance require to inspection of critical features where deterioration would cause a risk.

1.5.3 Selection criteria of plant equipment

Some of the important points for deciding equipment are detailed below:

- Select the production technology.
- Calculate the number of equipment required, with their capacities.
- Study the cleaning and sanitary provision to allow maintenance, cleaning, disinfection, monitoring and inspection.
- Material should be non-reactive, non-toxic, and non-corrosive and of food grade quality especially that coming in direct contact with the milk.
- It should be able to withstand processes like heating and cooling.
- Equipment should have provision for controlling and monitoring of temperatures, humidity, airflow and other parameters which else would be considered as harmful to food safety.
- Space requirement for equipment should be calculated.
- Spacing between adjacent equipment and service pipelines to facilitate maintenance.
- Develop flow diagram for identification of operation sequence and material flow.
- Consider the housing requirement for each product and equipment. Some products need to be manufactured in controlled atmosphere and need proper building, whereas others manufactured within the equipment kept in open.

1.5.4 Measuring the filling and sealing efficiency

Measure the filling and sealing line efficiency, its throughput, if the equipment is operating at maximum speed, and so on. These data points give a measure of a piece of the system but not necessarily an overall view of how effective the equipment is. Every piece of packaging machinery has an ideal cycle time (the time it takes to complete one finished product). Performance is measured against that ideal cycle time.

Factors affecting overall equipment efficiency

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).

1.6 Carrying out pre-start checks

1.6.1 Introduction of pre-start check

Pre-start checks are safety checks conducted on equipment before using the item. Commonly these are required for plant, equipment and machinery prior to being started or used each day. Pre-start checks are routine inspections conducted by the equipment operator, usually with the aid of an inspection checklist.

1.6.2 Full filling pre start checks

In an industry, there are many types of works to be operated. Before going to operate machine, there should be equipment inspection whether it is 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 before going to manipulate operations;

- Parameter setting (pressure, temperature, flow rate, etc.).
- Identify faulty conditions.
- Analyze maintenance requirements.
- Identify the possible hazards.
- Check it is complete, with all safeguards fitted, and free from defects.
- Follow manufacturer specification.
- Establish a safe system of work for using and maintaining the machine.
- Maintenance as required to prevent risk.
- Choose the right machine for the job.
- Make sure the machine/ equipment is;
 - ✓ Safe for work that has to be done when carrying out maintenance;
 - ✓ Properly switched off before clean or adjust the machine.

1.7 Checking and confirming required services for production

1.7.1 Service and equipment's used for filing and sealing process : service equipment's is that are necessary for production,

Processing, processing and servicing. These equipment is very important for continuous processing

A. Conveyor main purpose of a conveyor system is to move objects from one location to another. The design allows for movement of objects that are too heavy or too bulky for humans to carry by hand. Conveyor systems save time when transporting items from one location to another

Type of Conveyor Systems

Liquid Packaging Solutions offers both non-power and power conveyors for use with almost any packaging system.

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- **Power conveyors**

Power conveyors are the heart of automated packaging systems and are manufactured using stainless steel, aluminum to allow us to plan and create the belt conveyor systems for individual and unique packaging projects.

Variable speed power conveyors are manufactured using stainless steel, aluminum to allow the belt conveyor systems to be designed specifically for each customer's individual needs.

Power cooling conveyors are used for heated products or products that solidify after filling and may need time to cool or set prior to moving to the next packaging station.

- **Non-power conveyors**

Non-power conveyors are offered in several different styles, including close roller conveyors, skate conveyors and serpentine skate conveyors. These non-power conveyors are extremely useful for packing products or moving products from one station to another when packaging products manually or with semi-automatic packaging machinery.

Non-power conveyors include close roller conveyors, skate conveyors and serpentine skate conveyors. These conveyors are ideal for moving pails, buckets and boxes between packaging phases and also used at the end of an automated package.

B. Pump An industrial pump is a machine that transforms the mechanical energy it absorbs from an electric, thermal or other kinds of motor, and transfers it to a fluid as hydraulic energy. This allows the fluid to be transported from one place to another, on one level or different levels.

The operation of an industrial pump is simple: the inlet tube of the pump sucks the water and then is driven by a motor that uses coils and magnets to create a magnetic field, which gets the impeller to rotate continuously.

- C. Aseptic filler:** An aseptic filling machine is electromechanical equipment, specifically designed to fill packaging containers while maintaining sterility throughout the entire process filling machine is to fill the product into bag, pouch or container such as bin or bottle. Most of the merchandise are measured in prescribed quantity, then packed in a bag or container after the production process
- D. Hermetic sealers:** a hermetic seal is any type of sealing that makes a given object airtight (preventing the passage of air, oxygen, or other gases). The term originally applied to airtight glass containers, but as technology advanced it applied to a larger category of materials, including rubber and plastics.
- E. Bag fillers:** are used to load free-flowing dry materials from the production process into large bags for transport and/or storage. Filling bulk bags with product is an activity that needs to be carried out both safely and effectively.
- F. Seamers** A can seamer is a machine used to seal the lid to the can body. The lid or "end" is usually tinplated steel or aluminium (drinks) while the body can be of metal paperboard or plastic.
- G. Heat exchangers:** Heat exchangers are used to transfer heat from one medium to another. These media may be a gas, liquid, or a combination of both. The media may be separated by a solid wall to prevent mixing or may be in direct contact.

SELF-CHECK	Written test
1	

Name..... ID..... Date.....

Directions: Answer all the questions listed below.

Test I: Choose the best answer (4 point)

1. Which One is the cost effective packaging material?
A. Plastic B. Glass C. Metal Cans D. Aluminum cans
1. Which one of the following is not function of packaging?
A. Protect the product B. Medium communication C. Increase cost D. Containment
2. ----- is the material that first envelops the product and holds it.
A. Secondary packaging B. Tertiary packaging C. Primary packaging D. None
3. Good packaging materials should fulfill the following except?
A. Process ability B. Resistance ability C. High Permeability D. All

Test II: Short Answer Questions

1. Define canning and write types (4 points)
2. Define cleaning? (5 points)
3. Write cleaning methods? (5 points)
4. What is the aim of operational procedure during operating the equipment? (5 points)
5. Write down factors that affect overall equipment effectiveness? (5 points)

Operation Sheet -1

1.1 Identifying and confirming cleaning and maintenance requirements

A. Tools and equipment's

- Personal protective equipment
- Plate heat exchanger (hot water)
- Nitric acid detergents
- Caustic soda
- Pump
- Temperature regulator

B. Procedures/Steps/Techniques :

Step 1. Wear appropriate personal protective equipment

Step 2. Inspect the machine parts

Step 3. Turn on the power

Step 4. Adjust temperature of the water

Step 5. Pre rinse (104-140 ° F) for 10 minutes

Step 6. Circulation of alkaline detergent solution (0.5-1.5 %) 140-185 ° F for 30 minutes

Step 7. Rinse out alkaline detergent with 140 ° F

Step 8. Nitric Acid solution (0.5 -1%) with 130-150 ° F for 20 Minutes

Step 9. Final rinse with cold water for 8 minutes

1.2 Adjusting sealing and filling machine parts

A .Tools and equipment's

- ✓ Film holder and roller
- ✓ Motor
- ✓ Product receiver
- ✓ Volumetric cup
- ✓ Cutter
- ✓ Temperature controller
- ✓ Sealing Unit
- ✓ Drill
- ✓ Deferent size Files
- ✓ Screw
- ✓ Pliers
- ✓ Multi meter
- ✓ Step ladder
- ✓ Pipe wrench
- ✓ Hummer

B. Procedures/Steps/Techniques

- Step 1: Wear appropriate personal protective equipment.
- Step 2: select sealer machine to be adjust
- Step 3: Differentiate different parts of the sealer machine.
- Step 4: Select faulty and unfit parts of the sealer machine.
- Step 5: Adjust or assemble part of the equipment identified.
- Step 6: Test the Sealer and filler machine.
- Step 7: Record results.

1.3 Carry out pre start check

A .Tools and equipment's

- ✓ Multi meter
- ✓ Temperature controller
- ✓ Drill
- ✓ Deferent size Files
- ✓ Screw
- ✓ Pliers
- ✓ Step ladder
- ✓ Pipe wrench
- ✓ Hummer

B. Procedures/Steps/Techniques

Step 1: Wear appropriate personal protective equipment.

Step 2: Identify the available the Sealer machines.

Step 3 Disconnect the power of the machine

Step 4: Clean each components of the equipment.

Step 5: Check for damage on machine parts and maintain faulty parts.

Step 6: Adjust or assemble part of the equipment identified.

Step 7: Test the Sealer machine.

Step 8: Record results

LAP TEST-1	Performance Test
------------	------------------

Name.....

ID.....

Date.....

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **6: 30** hour. The project is expected from each student to do it.

Task-1perform machine clean in place

Task-2 Perform Adjust sealing and filling machine part

Task-2 Perform Conduct pre-start check of sealing and filling machine

LG #40 **LO #2 Operate and monitor the filling and sealing process**

Instruction sheet

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

- Starting and operating filling and sealing process
- Monitoring Equipment.
- Identifying equipment operation variation and reporting maintenance requirements.
- Monitoring Packaging quality and seal integrity
- Monitoring the process
- Identifying, rectifying and/or reporting Out-of-specification process outcome
- Maintaining the work area
- Conducting filling and sealing work.
- Maintaining workplace records

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 filling and sealing process
- Monitor equipment.

- Identify equipment operation variation and report maintenance requirements.
- Monitor Packaging quality and seal integrity
- Monitor the process
- Identify, rectify and/or report out-of-specification process outcome
- Maintain the work area
- Conduct filling and sealing work.
- Maintain workplace record

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 2

2.1. Starting and operating filling and sealing process

2.1.1 Operate Filling and sealing process

The form fill seal machines are a type of filling equipment that can fill in a packing material. The product should be free flowing type, either liquid or even granular.

The process involves certain steps, which will take place cyclically in auto operation.

There is option for variation in size and quantity of the product packed. To a large extent, the market milk is now being sold by packing in these machines.

The Form Fill Seal Machine has various controls for the following operations.

- Adjusting the temperature of sealing rod by controlling the electric supply, to match to the thickness of the film to be sealed.
- Adjusting the timing for the jaws to be engaged and simultaneously filling operations to take place, with a known quantity of fluid.
- Adjusting the quantity of fluid to be filled when jaws are engaged
- Adjusting the timing for the jaws to be engaged and allow time for movement of film to the required length of package.

Milk powder production and sealing: access date NOV. 25/2022 https://www.youtube.com/watch?v=HvLQbz33q_4&t=7s

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2.1.2 Filling operation

Solid foods are either in the form of large pieces or particles that flow like liquids. At a small scale of operation, large pieces are usually packed by hand whereas powders and small particulate foods can often be filled using similar fillers to those used for liquids. Liquids can be either thin (e.g. milk) or thick (viscous) such as creams.

The selection of suitable filling equipment depends on the:

- Viscosity,
- Temperature,
- Particle size and
- Foaming characteristics of the product, and the production rate required.

2.1.2.1 Filling thin liquids

A simple manual filling machine for liquids is made by fitting one or more taps to the base of a large bucket or tank. The bucket should be stainless steel for filling hot liquids or food-grade plastic for cold filling. In manual filling, the amount of food dispensed into the container is judged by the operator, and training is required to ensure that consistent volumes are filled into every container.

There are a variety of dispensing machines that control the volume of liquid that is filled into each container, and do not rely on the judgment of an operator.

Timed gravity fillers are an economical type of volumetric filling machine, but the range of applications is limited to low-viscosity liquids that do not foam. The product is contained in a tank above a set of pneumatically operated valves. Each valve is independently timed to deliver precise amounts of liquid under gravity into the containers.

Accepting filling and sealing, access date Nov, 26/2022

<https://www.youtube.com/watch?v=yClnHOBnZjY>

2.1.2.2 Filling viscous liquids and liquids that contain particles

Because viscous liquids do not flow easily, a dispenser or piston filler is the preferred option. This equipment is relatively low-cost but has lower production rates than piston fillers. A small gear-pump filler can be adjusted to dispense viscous liquids at volumes from 20 - 999 ml and has an anti-drip outlet that prevents food contaminating the sealing area of the container.

Semi hard cheese packaging: access date Nov.27/2022 <https://www.youtube.com/watch?v=8b40piYZHaY>

2.1.3 Sealing operation

Different types of closures for plastic and glass containers include metal or plastic caps and lids, and foil, plastic or paper covers. In practice the selection of a package and closure depends mostly on their local availability and relative cost.

The choice of packaging therefore is a compromise between what is required and what is affordable, the penalty being a reduction in shelf life of the food. Although total protection is not possible, tamper-resistant packaging delays entry into the package and tamper-evident packs indicate whether tampering has been attempted or has occurred.

A. Sealing plastic or glass bottles and jars

Bottle and jar closures for milk can be grouped in to two categories:

- **Normal seals:** Normal seals, used for non-carbonated liquids e.g. milk:
 - ✓ Pre-threaded, aluminum screw caps.
 - ✓ Lug type screw twist-off steel caps. (tamper-proof and have vacuum seal)

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- ✓ Press-on, prise-off (to use force to lift something off something) plastic caps.
- ✓ Push-in pull-out, or push-on pull-off caps, such as cork or synthetic stoppers.

Sealing mechanism / access date Nov. 21/2022 <https://www.youtube.com/watch?v=w0uVbTPd68w>

- **Vacuum seals:** Vacuum seals, used for hermetically/ closed sealed jars:
 - ✓ Screw-on twist-off or screw-on screw-off caps.
 - ✓ Press-on prise-off, or press-on twist-off caps.
 - ✓ Crimp-on prise-off caps.

B. Sealing pouches, bags and sacks

Plastic films

Most plastic films are heat sealed but cold seals or adhesive seals are sometimes used for heat sensitive products e.g. chocolate, chocolate-coated biscuits or ice cream. To seal flexible films, the two surfaces of the film are heated until they partly melt and pressure is used to fuse the films together.

Vertical packaging machines can only process packaging materials that can be melted to themselves under the influence of temperature, time and pressure.

In the heat-sealing system, there are three important variables which determine the strength of the seal;

- Temperature,
- Pressure and
- Time.

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2.1.4 Aseptic filling

Aseptic filling and sealing can be defined as the process in which ultra-heat temperature processed or sterilized milk is filled in pre-sterilized containers under aseptic/sterile environment. This ensures that there is no post processing contamination of the milk so that the product has longer shelf life.

Aseptic filling and sealing has been defined as also a procedure consisting of sterilization of the packaging material or container, filling with a commercially sterile product in a sterile environment, and producing containers which are tight enough to prevent recontamination, i.e. which are hermetically/ closed sealed.

For products with a long non-refrigerated shelf life the package must also give almost complete protection against light and atmospheric oxygen. A milk carton for long life milk must therefore be provided with a thin layer of aluminum foil, sandwiched between layers of polyethylene plastic.

Ultra High Temperature milk can be defined as a product obtained by heating milk in a continuous flow to a temperature in excess of 125°C for not less than two seconds and immediately packaging in sterile packages under aseptic conditions.

The Ultra High Temperature milk packing machine is different than the usual machine in that the packaging material is multi layered, and the filling is done in an absolutely aseptic condition. . The packaging material is first sterilized and then formed into a tube. The tube is filled with product and then shaped and cut into individual packages

Filling sealing / access date <https://www.youtube.com/watch?v=-xvw1SNNfio>

Material used for filling sealing process

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Figure 2.1 Packaging cup



Figure 2.2 steam sterilizer



Figure 2.3 Cleaning detergent caustic soda

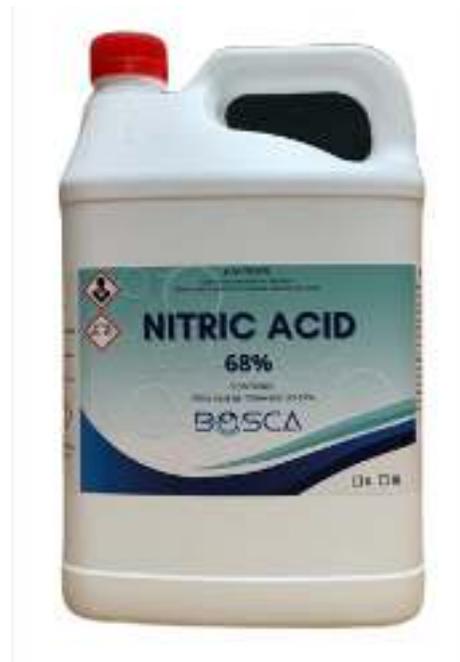


Figure 2.4 Nitric acid detergent

2.2 Monitoring Equipment.

2.2.1 Introduction

Milk and milk product processors use a variety of machines for different production lines and for various milk product types. Several machine types are integrated into a single filing, sealing, canning and packaging line.

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Machine types and parts to be monitored include:

- **Conveying machine:**

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.

- **Filling machine:** the filling station can adjust the number of filling heads according to the actual production speed demand. The filling 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.
- **Sealing machine:** 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.
- **Ink jet coders (stamping information)** ink jet coders are a very multipurpose, proven solution for date coding, batch numbering and product identification, including: milk bottles, tetra elements, cartons, etc.

Coding, labeling and marketing milk and milk products and packaging should have;

- ✓ Consistently clear coding.
- ✓ Print text, graphics and bar codes on a range of substrates.
- ✓ Large selection of color inks including Industry and Food Grade Inks.
- ✓ Print just about anywhere on the product.
- ✓ Excellent ink adhesion even with condensation

- **Labelers:** Label means any tag, brand, and mark, pictorial or other descriptive matter, written, printed, marked, embossed, and graphic, perforated, stamped or impressed on or attached to container, cover, lid or crown of any food package and includes a product insert.

Labelers are labeling machines that dispense, apply or print-and-apply labels to various dairy, products, items, containers, or packages which are finished. The most popular types of labeling machinery are the automatic labeling machine, which is able to do its job without needing an operator.

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
 - ✓ Date marking and storage instructions
 - ✓ Instructions for use and special storage requirement
- **Shrink wrappers:** Shrink wrap is a polymer plastic film that is used to cover products. Shrink wrap is applied to tightly fit a product using a heat source that shrinks the wrap to the particular dimensions of the product it's covering.

2.3 Identifying equipment operation variation and reporting maintenance requirements

2.3.1 Techniques of identifying equipment variations

There are different techniques which used to identify potential variation in equipment operation and sealing, filling and packaging production line.

In order to identify variations, consider the following points.

- 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 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 report faults and any identified causes in accordance with workplace procedures.
- Follow machine manufacturers manual.

2.3.2 Method of corrective action in response to variations

A. Define the Problem

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

B. Temporary Actions

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Once a problem has been detected, the first priority should be to contain the problem, and prevent delivery to the customer. If already delivered, the customer needs to be notified to prevent further liability.

C. 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.

D. Permanent Actions

The process should be reviewed to arrive at a solution for correcting the root cause. The solution may involve longer term planning, requiring milestone dates, capital justification, training, and/or approval from the customer.

E. Prevention

Preventative maintenance is a systematic approach to building operations that aims to predict and prevent disastrous equipment failures before they occur. To accomplish this goal, facilities personnel conduct routine inspections, maintenance and repairs on assets to ensure they work as the manufacturer intended. Functional equipment allows facilities staff members to focus less on reactive maintenance and more on upcoming maintenance tasks or time-sensitive work orders.

It’s better to prevent issues than react to them. Preventive maintenance reduces the likelihood of unexpected issues by promoting optimal equipment performance.

The following are ways of facilities for preventive maintenance:

- ✓ Schedule and perform regular inspections of equipment
- ✓ Conduct regular cleaning of buildings, grounds and assets

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- ✓ Lubricate moving parts to reduce wear-and-tear
- ✓ Adjust controls for optimal performance and energy efficiency
- ✓ Repair and replace any defective equipment parts

2.3.3 What are the benefits of preventive maintenance?

Preventive maintenance has two all-encompassing goals: to increase asset longevity and productivity and to keep people and assets safe from harm.

Preventive maintenance to achieve various benefits, including the following:

- Diminish excess depreciation of equipment
- Prevent untimely breakdowns of critical equipment
- Eliminate unnecessary inspections and maintenance tasks save money by extending the useful life of assets
- Prepare for and prevent future issues from occurring

What's the difference between Reactive Maintenance and Preventive Maintenance?

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- ✓ **Reactive maintenance** focuses on diagnosing and fixing a problem once an asset has already broken down or malfunctioned. A maintenance technician identifies the issue that occurred and takes steps to restore the asset to operational condition.

Reactive maintenance can be expensive. Facility managers face heavy costs when an asset breaks down unexpectedly, including costs to diagnose the issue, replace parts and ultimately fix the problem

- ✓ **Preventive maintenance** emphasizes regularly scheduled maintenance tasks. The goal of preventive maintenance is to give an asset the care it requires while it's still running. This approach actively minimizes the chance of failure, costly repairs and unscheduled downtime. Preventive maintenance can dramatically reduce the probability of these risks.

2.4 Monitoring Packaging quality and seal integrity

2.4.1 Monitoring packaging quality

Packaging is 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.

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Type and method of packing depends on various factors includes:

- Food item /Type
- The process of production,
- Quality of food,
- Shelf life desired,
- Transport considerations, etc.

2.4.2 Types of packaging mostly used in dairy industry

A. Vacuum packing

Vacuum packaging is a method of packaging that removes air from the package prior to sealing. A vacuum is simply the absence of air. This method involves placing items in a plastic film package, removing air from inside and sealing the package. Vacuum packing or vacuum sealing is a form of packaging that involves the removal of air and sometimes its replacement from a pouch or plastic container.

Vacuum sealing and packaging has the following advantages:

- Protection against dehydration;
- Barrier against air or moisture;
- Tamper evident protection;
- Compressed sealing and packaging for fragmented cores;
- Protection from dust and moisture

B. Modified Atmosphere Packaging (MAP)

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Modified Atmosphere Packaging is a packaging method in which an altered atmosphere inside a package is used to retard chemical deterioration of the product, and the growth of unwanted microorganisms.

Modified Atmosphere Packaging improves the product quality, freshness and increases the shelf-life of the product as well as provides convenience to the consumer and adds value to the product. It is mainly used to extend the shelf life of fresh produce and perishable products.

In a modified atmosphere package, the product is exposed inside the pack to the normal atmospheric gases (oxygen, nitrogen, carbon dioxide and water vapour) but in concentrations which are different from those in the ambient air.

Seal integrity is vital in products where a modified atmosphere is used to help preserve the product, and so it will be no surprise that methods are constantly being developed to spot leaking packs in this area. The gas introduced needs to be in a low percentage and also to be easily detected in the event of a leak.

Advantages of Modified Atmosphere Packaging Technology

- Increased shelf-life allowing lesser frequency of loading of retail display shelves.
- Improved presentation clear view of the product and all round visibility.
- Hygienic stackable pack sealed and free from product drip and odour.
- Reduce production and storage costs

Disadvantages of Modified Atmosphere Packaging Technology

- Capital cost of gas packaging machinery
- Cost of gases and packaging materials

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- Increased pack volume increases transport costs and retail display space



Figure 2.1 Modified Atmosphere Sealer Packaging Machine

Modified atmosphere packaging: access date Nov. 25/2022

<https://opackmakine.com/en/milk-and-milk-products/>

2.4.3 Monitoring Sealing integrity

Package integrity testing is important in determining the shelf life of a product, such as bottle caps, aerosol cans and valves trigger pumps, ink cartridges, cosmetic bottles, food sachets and other various types of packaging.

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Seal strength is a quantitative measure for use in process validation, process control, and capability. Seal strength is not only relevant to opening force and package integrity, but to measuring the packaging processes' ability to produce consistent seals.

Package integrity testing equipment includes two test methods:

A. Vacuum leak: This method is to immerse the sample into water within the vacuum chamber, and then evacuate the vacuum chamber to form differential pressure between the inside and outside of specimen.



Figure 2.2: Leak tester

B. Leak and Seal Strength Tester: it is professionally designed for the leakage tests of packages for milk products. The instrument also can be used to test seal performance of specimens after falling and compression tests.



Figure 2.3: Leak and Seal Strength Detector

Seal Strength Detector access date Nov. 24/2022 <https://www.youtube.com/watch?v=vOuuSKj8yEE>

2.5 Monitoring the process

2.5.1 Monitoring the process of filling and sealing based on specifications

Dairy product sealing and packaging process should be proceed in accordance with work place procedures, operation procedures, and should meet quality specifications.

The packaging assessment must include a definition of the optimum quality standards and these standards should not be compromised by cost.

Ideally, sealing and packaging supplier selection is a techno-commercial decision agreed during discussions between the purchasing function and packaging technologists.

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2.5.2 Recommendations for immediate action by processors

It is recommended that processors follow sealing and packaging suppliers using a simple checklist that includes:

- Detail of the content and thickness of the proprietary sealing and packaging laminate.
- Should the supplier quote 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 sealing and packaging will perform throughout the shelf life of the product.
- An assurance that the packaging will withstand the special environmental conditions

Monitoring filling and sealing process may be done on:

- ✓ Product quality
- ✓ Seal integrity
- ✓ Filling operation
- ✓ Sealing operation Bag fillers
- ✓ Level detection equipment
- ✓ Conveyors suitability

2.6 Identifying, rectifying and/or reporting Out-of-specification process outcome

2.6.1 Out of specification out comes

The term out of specifications are defined as those results of in process or finished product testing, which falling out of specified limits.

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The out of specifications, may arise due to deviations in product sealing and filling manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When an out of specifications has arrived, a root cause analysis has to be performed to investigate the cause for out of specifications.

The reasons for out of specifications can be classified as assignable and non-assignable. When the limits are not in specified, limits are called out of specifications. When out of specifications has occurred, the analyst should inform to quality control manager. Each out of specification will be identified with a unique identification number.

The out of specifications investigation involves 2 phases.

A. Phase I investigation

The purpose of this investigation is to identify the cause for out of specification result. The reason for the out of specification may be defect in measurement process or in manufacturing process.

B. Phase II investigation

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

2.7 Maintaining the work area

2.7.1 Maintaining work area

The work environment and facilities are required to be maintained in a safe and healthy condition, and need to be hygienic, secure and in a serviceable condition for filling, sealing and sealing processing operation.

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

The work area should maintain according to housekeeping standards and workplace procedures in order to undertake our production line without any defect.

The filling and sealing work area should consider the following points:

A. Work area entry and exit

Generally the filling and sealing operation area entry and exit should have:

- Entries and exits should be slip resistant under wet and dry conditions.
- Any pathways shall be marked with visible colours.
- Separate entry and exits for mobile equipment.
- Power operated doors and gates should have safety features.
- Location of exits should be clearly marked and signs posted to show direction.

B. Floors and Other Surfaces

Work area floor should be:

- Floors shall be free from slip hazards.
- Floor surfaces shall have sufficient grip to prevent slipping.
- Anti-fatigue matting, carpet, shock absorbent underlay.
- Floors should be strong enough to support loads placed on them.
- Allows adequate space for leg clearance and freedom of movement.

2.7.2 Processing area must fulfil the requirements:

A. 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.

B. Ventilation

Workplaces 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.

C. Welfare Facilities

Workers, including those who have particular needs or disabilities, must have access to the facilities provided.

Welfare facilities for workers who have particular needs or disabilities are to be provided with:

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

2.8 Conducting filling and sealing Work

2.8.1 Conducting work in accordance with workplace guideline

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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.

A safe work environment including:

- Facilities,
- Conveniences, and,
- Accommodations.

2.8.2 During conducting work, a person should ensure the following requirements:

A. Legislative requirements

- Maintain environment safety by disposing wastes safely.
- The layout of the workplace allows, and the workplace is maintained.
- Allow work to be carried out without risk to health and safety,
- Are designed and installed according to company legislative and requirements
- Are inspected and maintained to ensure a safe level of hygiene.
- Work in relation to or near essential services does not give rise to a risk.

B. Responsibilities

The facilities management division is responsible for ensuring that workplace amenities and facilities:

- Work areas have space for work to be carried out without risk to health & safety.
- Floors and other surfaces are designed, installed and maintained

C. 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 difficult activities may need to access shower and change room facilities.

D. 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.

E. The composition of the workforce

The workforce may be comprised of people of different sexes, religious beliefs and those people with special needs. This will influence the provision of amenities and facilities to accommodate the various needs.

2.9 Maintaining workplace records

2.9.1 Workplace record keeping

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Record keeping is an activity simply to collect relevant information that can help to take good decisions and to keep track of activities in packaging operation.

Records can be done about;

- Any performance of filling, sealing and packaging,
- Economic development about the processing plant , or
- Any activity of the worker.

Workplace records have the following importance for dairy processing plant. It used to:

- ✓ Determining profitability of the processing plant.
- ✓ Decision making, especially on a strategic level
- ✓ Compare the efficiency of use of inputs,
- ✓ Rationalize labour
- ✓ Planning and management
- ✓ Assess profitability/losses (financial records)

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SELF-CHECK – 2	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

Test I: Multiple choose (2pts each)

1. The selection of suitable filling equipment depends on the;
 - A. Viscosity B. Temperature C. Particle size D. All

2. which one of the following is important variable to determine the strength of the seal?
 - A.temperature B.pressure C. Time. D. All

3. Which one of the following is importance of Labeling?
 - A. Communication with consumer B. Product identity C. General Characteristic D. All

4. Which one of the following is importance of Labeling?
 - A. Communication with consumer B. Product identity C. General Characteristic D. All

5. The type and method of packing depends on;

A. Food item B. Quality of food C. Transport considerations D. All

6. Which one of the following is a benefit of Vacuum packaging?

A. Protection against dehydration C. Tamper evident protection

B. Barrier against air or moisture D. All

Test I: give short answer

1. Define Aseptic packaging(2 points)
2. What are the techniques used in identifying equipment variations? (5pts)
3. Mention types of packaging. (3 points)
4. Define the term out of specification out comes? (5 points)
5. Write down points to be considered in maintaining packaging work area (3)
6. Write things fulfilled in a safe working environment (2)
7. What is record keeping? (2)
8. Write the importance of recording (2)

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

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

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Operation Sheet -2

2.1 Starting and operating filling and sealing process (yoghurt)

A. Tools and equipment's

- Personal protective equipment's
- Filler machine
- Sealer machine
- Sterilizer
- Packaging cup
- Cleaning detergent (nitric acid , caustic soda)

Procedures/Steps/Techniques

Step .1 Wear appropriate personal protective equipment's.

Step .2 Inspect filling and sealing machine.

Step .3 Clean the machine

Step .4 Prepare cup for filling and sealing

Step .5 Turn on power

Step .6 Adjust control panel

Step .7 Sterilizing cup

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Step .8 Start Pump product from holding tank to filling machine

Step .9 Start Filling

Step .10 Operate Sealing

Step .11 Operate Canning

Step .12 Clean filling machines

LAP TEST-2	Performance Test
-------------------	-------------------------

Name.....

ID.....

Date.....

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1.30 hour**. The project is expected from each student to do it.

Task-1perform filling and sealing process

LG #41

LO #3 Shutdown the filling and sealing process

Instruction sheet

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

- Identifying the appropriate shutdown procedure
- Shutting down the process according to workplace procedures.
- Identifying maintenance requirements documented and reported.
- Recording, documenting and reporting work place information

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 the appropriate shutdown procedure
- Shut down the process according to workplace procedures.
- Identify maintenance requirements documented and reported.
- Record, document and report work place information

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 3

3.1 Identifying the appropriate shutdown

procedure

3.1.1 Identifying shutdown procedure

Normal shutdown includes steps to provide the systems safe, such as removal of hazardous process materials and inert gases. The systems might be cleaned as part of the shutdown.

Cleaning is often a process for itself requiring its own set of startup, operation, and shutdown procedures.

Shut down process indicates all cleaning and maintaining activities after completion of a specific operation in the processing plant.

There should be Scheduled shutdown which is initiated by the operator during normal operation of the unit.

Scheduled unit shutdown will prevent possible damage and injury both to equipment and the operator.

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

3.1.2 Some stages taken in a unit shutdown may include:

- 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

The shutdown should be a scheduled or planned sequence

- ✓ Isolated (process, mechanical and electrical)
- ✓ Cooled and depressurized
- ✓ Removed or cleaned and gas freed
- ✓ Gas tested on a continuous basis prior to and during e

An emergency shutdown is also initiated in the event of:

- ✚ Fire
- ✚ Major spill,
- ✚ Instrument failure,
- ✚ Power failure
- ✚ Total loss of control of chemical or physical processes.

3.2 Shutting down the process according to workplace procedures.

3.2.1 Shutting down the Process

Machine shut down should be done to prevent open bags from being made; the temperature limits must be closely monitored. As soon as the set limits are exceeded, the machine must automatically stop.

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.

Preventive maintenance is required whether the shutdown affects all manufacturing lines or just a portion; use the disruption as an opportunity to perform preventive maintenance on equipment. The manufacturer's operation and maintenance manual is the best source for guidance on how to care for equipment and how to identify issues that need repair. Dealing with repair needs today will help to be better able to restart quickly.

3.3 Identifying maintenance requirements documented and reported.

3.3.1 Identifying 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 equipment may include:**
 - ✓ Cleaning,
 - ✓ Lubricating,
 - ✓ Simple tool repairs and adjustments.

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- **Maintenance requirements can be:**
 - ✓ Preventive or proactive maintenance
 - ✓ Corrective or reactive maintenance

3.3.2 Routine maintenance tasks

It refers 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/outlet,
- Sharpening blunt /rounded 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.
- ✓ Use and maintain power tools according to their operator instructions.
- ✓ Make sure power tools are properly grounded.
- ✓ Keep all guards and shields in place.
- ✓ Unplug and store tools after use.

Table 2. Maintenance check list

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	Tool	Yes	No	Remark
1	Are tools and machines 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?			

3.3.3 Documenting and reporting maintenance requirements

In order to report faults and problems, there should be maintenance schedule. 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. A maintenance schedule assigns a specific date to specific maintenance tasks.

Table 3 Documenting and report maintenance

No.	Date	Equipment	Maintenance Check points	Maintenance Required	Signature
1					
2					
3					

3.4 Recording, documenting and reporting work place information

3.4.1 Recording and documenting workplace information

Recording and documenting workplace information is an activity simply to collect and organize relevant information that can help to take good decisions and to keep track of activities in filling, sealing and packaging operation of a processing plant.

Records and documents can be done about;

- Performance of filling, sealing and packaging operation
- Economic development
- Any activity of the order
- Standard Operating Procedures (SOPs)
- Specifications of filling, sealing and packaging machines and materials
- Production schedules and instructions
- Batch/recipe instructions about production, etc.

Workplace records and documents have the following importance for dairy processing plant. It used to;

- ✓ Determining profitability of the processing plant.
- ✓ Decision making, especially on a strategic level
- ✓ Compare the efficiency of use of inputs,
- ✓ Rationalize labour

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- ✓ Planning and management
- ✓ Assess profitability/losses (financial records)

3.4.2 Reporting work place information

Recorded and documented workplace information about the filling, sealing and packaging operation of the processing plant should be reported for concerned body at the right time of reporting.

Reporting workplace information for the concerned body is used to;

- Determine possible quality defects.
- Take a corrective action for the occurred defects.
- Follow workers activity
- Know the production level of the processing plant

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SELF-CHECK – 3	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

Test I: give short answer

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

1. What is recording and documenting workplace information? (3point)
2. Write the advantage of recording and documenting workplace information? (2 point)
3. Discuss the importance of reporting workplace information for the concerned body? (3point)