Confectionery Processing

Level-II

Based on May 2019, Version 2 Occupational standards

Unit of Competence: - Operate a continuous Cooling process

Module Title: - Operating a continuous Cooling Process

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LG #79	LO #1-Prepare the cooling 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 available services and Materials.
- Identifying and confirming the cleaning and maintenance status.
- Fitting and adjusting the cooling and related equipment/components
- Entering the processing/operating parameters to meet safety and production requirements
- 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 available services and Materials.
- Identify and confirm the cleaning and maintenance status.
- Fit and adjust the cooling and related equipment/components
- Enter the processing/operating parameters to meet safety and production requirements
- Check and adjust equipment performance.
- Carry out 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 available services and Materials.

1.1 Confirming available services and Materials.

- ❖ Services may includes
  - gas
  - water
  - power
  - vacuum
  - compressed and instrumentation air
- ❖ Materials may include to:

- shaped gum before transported coated machine in to wrapping

Fig1 food transported machine/stem convey velt

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/false

1. Compressed and instrumentation air is a services which is used for cooling process (5point).

Test II: Choose the best answer

1. Which one of the following used cooling process (5points)?

A. Power B. Gas C. Vacuum D. All

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

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

Information Sheet- 2- Identifying and confirming the cleaning and maintenance status.

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2.1 Identifying and confirming the cleaning and maintenance status.

Cleaning is the removal of all visible soil in an approved way with the use of mechanical and chemical action or both, so that all areas are cleaned and sanitized to a high standard. Cleaning is an investment in the assets of a building

Fig 1 cleaning water sinks

Fig 2 cleaning equipment

- Reasons for Cleaning, includes the following:
  - To reduce the risks from food hazards -food poisoning and foreign body Contamination
  - To comply with local and international legislation
  - To meet specific customer requirements, e.g. Tesco
  - To meet the requirements of global food safety standards (GFSI)
  - To maintain positive audit and inspection outcomes
  - To allow maximum plant productivity
  - To present a hygienic visual image
  - To promote safe working conditions for staff, contractors and visitors
  - To maintain product shelf-life

- To avoid pest infestation

❖ Frequency of cleaning

- **Daily clean** - These are tasks that need to be done at least once daily. Some Areas and items will need to be cleaned several times per day e.g. Public Toilets
- **Weekly clean** - These are areas or items that need to be cleaned weekly. This may be scheduled on certain days of the week e.g. Monday - Clean the West Wing windows internally, Tuesday - Clean the ast Wing windows internally, Wednesday - Clean lift grills on floors 8-14 on lifts 9 and 10
- **Team Cleaning** - This means that there will be a team of people each with their own task working in the same area at once e.g. In a public toilet area one person would clean all the toilet cubicles whilst another will clean all the wash hand basins followed lastly by somebody to clean all the floors. Team cleaning is rare .In hotels but in large entertainment venues or offices, this practice is common. This will save all cleaners having to carry all pieces of cleaning equipment, instead just carrying the equipment they will need for their specific tasks
- **Periodic cleaning** - Tasks that are done on a regular periodic basis such as deep cleaning of carpets and upholstery, cleaning of chandeliers or windows. This cleaning will be planned and may involve at times using external contractors.

There are many reasons why we clean but the most important ones are -
Health Regulations

❖ Maintenance is the upkeep of all furniture, fittings and equipment to an exacting standard within the property so that all areas look consistently new and pristine.

❖ Types of maintenance tasks are endless and must be classified as:

- Urgent maintenance is defined as a task that must be attended to immediately. If not attended to as a matter of urgency a small problem may become a larger problem.

- Preventative maintenance should be ongoing and included in everyday operations. Preventative maintenance is designed to prevent breakdowns and complaints and is vital in maintaining the investment.

Fig 3 Identifying maintenance status

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

1. Which one of the following removal of all visible soil (3point)?

A. Cleaning B. Maintenance C. A and B

Test II: Say true/false

1. Urgent maintenance is defined as a task that must be attended to immediately (3point)

Test III: Short answer

1. Write the difference between cleaning and maintenance (4point)

_____

_____

_____

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

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

Information Sheet 3- Fitting and adjusting the cooling and related equipment/components.

3.1 Fitting and adjusting the cooling and related equipment/components

Fitting is the process of applying craft methods such as skilled filing to the making and assembling of machines or other products. Fitting means ready, appropriate, or in keeping, whereas proper means suited or acceptable to the purpose or circumstances. Fitting is also noun with the meaning a small part, especially a standardized or detachable part of a device or machine.

❖ Cooling and related equipment May include to:

- in-line extruders
- fans
- AC (automatic cooler)
- pumps
- gum feeder,
- panel board (to control the equipment)
- conveyer belt (to transport the product)

Fig 1 cooler

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/false

1. Fitting is the process of applying craft methods such as skilled filing to the making and Assembling of machines or other products (2point).

Test II: Choose the best answer

1. Which one of the following cooling and related equipment (3point)?

A. in-line extruders B. AC (automatic cooler) C. fans D .All

Test III: Short answer

1. Write the at least three cooling and related equipment (5point)

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

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

Information Sheet 4- Entering the processing/operating parameters to meet safety and production requirements.

4.1 Entering the processing/operating parameters to meet safety and production requirements.

The main requirement is to have turbulent flow across the product and this is generally agreed to occur once the air speed has reached 5m/sec (990ft/min). There is little advantage in exceeding this rate unless the air is heated significantly on its return to the cooler coils.

The processes of tempering and cooling are related and are best considered as a single two stage process. The parameters must be matched both to the plant and the recipe in order to give high quality work and efficient operation

Fig 1 Entering the production process

Requirements of efficient cooling system the two main requirements of an efficient cooling system are:

1. It must be capable of removing only about 30% of the heat generated in the combustion chamber. Too much removal of heat lowers the thermal efficiency of the engine.
2. It should remove heat at a fast rate when the engine is hot. During the starting of the engine, the cooling should be very slow so that the different working parts reach their operating temperatures in a short time.

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

1. Which one of the following cooling and related equipment (3point)?

A. in-line extruders B. AC (automatic cooler) C. fans D .All

Test I: Short answer

1. Write the at least three cooling and related equipment (5point)

_____

_____

_____

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

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

Information Sheet 5- Checking and adjusting equipment performance.

5.1 Checking and adjusting equipment performance

Condition monitoring and Process analysis most equipment and process characteristics which affect quality, availability, capacity, safety, risk and cost can be continually evaluated throughout an asset's lifetime. This is essential in identifying impending failure and will be applied to critical areas identified in the reliability plan.

There are the obvious functions of monitoring and controlling the process for reasons of safety and product specification. Additionally, there is invaluable information to be gained from the process parameters that can give an understanding of the current health of the asset. Condition Monitoring has historically focused on the acquisition and analysis of measurable parameters that would give useful information as to the condition of machine components and, hence, a forecast of the likely serviceability of the machine. Measuring machinery health by performance monitoring has the potential to give warning of a developing failure through the changing levels of a suitable parameter being measured, thereby indicating a change in condition of a component, machine or system.

Fig 1 Checking and adjusting equipment performance

The definition of Condition Monitoring embraces the concept of Performance Monitoring also: The process of systematic data collection and evaluation to identify changes in the performance or condition of a system or its components, such that remedial action may be planned in a cost effective manner to maintain reliability.

- **The Purpose of Performance Monitoring**

There is the classic story of the condition monitoring technician who completed a vibration survey on a pump after it was reported as running erratically. He reported that the pump had the lowest vibration levels ever measured and it was therefore in perfect condition. Shortly after receiving this advice the plant operator noted that the pressure gauge was much lower than usual and further investigation showed that the pump wasn't pumping at all.

Applications for Machinery Performance Monitoring Machines and Systems for which Performance Monitoring surveys may be required on a routine basis include the following items:

- Pumps – due to impeller wear, seal ring wear (re-cycling) or blockage.
- Fan Systems – due to filter blockage, blade fouling or re-cycling.
- Boilers – due to loss of thermal efficiency for many different reasons.
- Heat Exchangers – due to fouling or blockage.
- Steam Turbines – due to blade fouling and numerous other reasons.
- Air Compressors –due to wear, filter blockage, valve leakage (reciprocating), etc.
- Diesel or Gas Engines – due to loss of compression (rings or valve leakage) etc.
- Electrostatic or bag dust filters – due to fouling, shorting or leakage.

- Condition Monitoring and Process Analysis

  Most machine and process characteristics which affect

- availability
- capacity
- quality

- safety
- Risk and cost can be continually evaluated throughout an asset's lifetime.

This is essential in identifying impending failure and will be applied to critical areas identified in the reliability plan.

Condition Monitoring has historically focused on the acquisition and analysis of measurable parameters that would give useful information as to the condition of machine components and, hence, a forecast of the likely serviceability of the machine.

The wider view of Condition Management must take into account

- the performance of the machine
- or the system of which it is a part
- And report on excursions away from previously defined acceptable tolerances.

The definition of Condition Monitoring embraces the concept of Performance monitoring also the process of systematic data collection and evaluation to identify changes in the performance or condition of a system or its components, such that remedial action may be planned in a cost effective manner to maintain reliability.

❖ Applications for Machinery Performance Monitoring

Machines and Systems for which Performance Monitoring surveys may be required on a routine basis include the following items:

Note**:** Those electric motors are not included on the list because fall-off in performance is usually measurable by standard condition monitoring processes such as vibration and thermography.

Perhaps the most useful parameter for performance measurement of an induction motor is speed in relation to load. This should always be a constant and variations are measurable with vibration analysis.

Therefore, generally speaking, special purpose performance monitoring surveys for electric motors are not required.

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/false

Condition Monitoring has historically focused on the acquisition and analysis of measurable parameters (3point)

Test I: Choose the best answer

1. Most machine and process characteristics which affect (3point)
   A. Availability
   B. Capacity
   C. Quality
   D. Safety

Test I: Short answer

1. The Purpose of Performance Monitoring (5point)

_____

_____

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

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

Information Sheet 6:- Carrying out Pre-start checks

6.1 Carrying out Pre-start checks

A pre-start inspection involves a routine examination of a piece of equipment by its operator that is standardized via a checklist. Whether it be a light vehicle, heavy vehicle, mobile plant or tools, pre-start inspections are an important task with financial, and more importantly, safety implications.

The purpose of an inspection is to identify whether work equipment can be operated, adjusted and maintained safely – with any deterioration detected and remedied before it results in a health and safety risk. The need for inspection and inspection frequencies should be determined through risk assessment.

Preliminary operations**:** check if the machine has been damaged during transport. Check the condition of the machine taking a close look at the outside and the inside. Any deformation of the visible parts indicates that the machine has been hit by something during transport. This could lead to malfunctioning. Check the tightening of screws, bolts and fittings. Damage caused by transport should be attributed to the carrier and the manufacturer or its agent should be informed immediately of the situation.

Fig 1 pre-start check machine

❖ **Check the Cleaning of the machine**

- Remove the dust and dirt deposited on the surface during transport.
- Carefully clean and dry each part (varnished or unvarnished) using soft, clean and dry cloths

- Should the box pallets remain outdoors for some time, waiting to transported inside the building, these box pallets should be covered with adequately-sized waterproof tarpaulins.
- If storage exceeds 3 months the box pallets should be stored inside, sheltered from bad weather and protected from excessively high or low temperatures.
- If the machine is unpacked, it should be covered in order to prevent the buildup of dust and dirt

❖ **Analysis of these records can identify**:

- ➢ common problems by model;
- ➢ spare parts most frequently used by model;
- ➢ number of repair or maintenance activities performed in a month by administrative area;
- ➢ service histories of individual devices;
- ➢ equipment operator training needs; and
- ➢ Cost–effectiveness of equipment maintenance and repair services.

❖ **Checking the safety devices:**

Before starting the machine, the safety devices should be checked according to the following procedure:

- ✓ Correct operation of the emergency stop button, while the machine is working, press the emergency button: the machine should stop immediately.
- ✓ Correct operation of the safety limit switches, while the machine is working lift the protection grid, the machine should stop immediately. .

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/false

1. Preliminary operations: check if the machine has been damaged during transport (3point)

_____1.Involves a routine examination of a piece of equipment by its operator that is standardized via a checklist (3point)

A. pre-start inspection B. Memtenance C. A and B

Test I: Short answer

1. What is pre-start check(4point)

_____

_____

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

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

Operation sheet 1	Fitting and adjusting the cooling and related Equipment/components.

Procedure:-

1. Apply PPE/personal protective equipment
2. Check cooling equipment present/not
3. Check equipment functionality
4. Prepare the equipment in one place for fitting
5. Then fit the cooling equipment component

Operation Sheet 2- Carrying out Pre-start checks

Procedure

Step 1: Apply PPE and prepare operation equipment.

Step 2: Check operating machine functional/not

Step 3: Check cooling equipment

Step 4: Disinfection equipment.

Step 5: Start operating

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

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

Task- 1. Pre-start checks

Task-2. Fit and adjust the cooling Equipment

LG # 80	LO #2-Monitor the cooling process operation

Instruction sheet

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

- Starting and Operating the process.
- Monitoring the Operation of equipment and processes.
- Operating the cooling process.
- Monitoring the process.
- Identifying, rectifying and/or reporting out-of-specification product/process.
- Maintaining the work area
- Conducting the work.
- Maintaining workplace records

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 the process.
- Monitor the Operation of equipment and processes.
- Operate the cooling process.
- Monitor the process.
- Identify, rectify and/or reporting out-of-specification product/process.
- Maintain the work area
- Conduct the work.
- Maintain workplace records

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1:- Starting and operating the process.

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1.1 Starting and operating the process.

Start, operate, monitor and adjust process equipment to achieve required outcomes, including monitoring control points and conducting inspections as required to confirm process remains within specification, such as:

- flow rates
- churn speed
- time/temperature
- ingredient addition systems
- pressures

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

The operators in the industry are - in general - craftsmen knowing how to manufacture a good product and not just technicians. Tanis control systems are built and designed to operate the plant without the need for special computer skills.

Fig 1 operating machine

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/false

1**.** Start, operate, monitor and adjust process equipment to achieve required outcomes (5point)

Test I: Short answer

1. What is the basic operating principles of equipment (5point)

_____

_____

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

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

Information Sheet 2:-Monitoring the Operation of equipment and processes.

2.1 Monitoring the Operation of equipment and processes.

Monitoring is the systematic process of collecting, analyzing and using information to track a programmer's progress toward reaching its objectives and to guide management decisions. There are three basic categories of monitoring; technical monitoring, functional monitoring and business process monitoring.

Workers have to monitor the equipment's operation correctly and report tools/equipment malfunctions or problems according to procedures to his immediate supervisors. There are the obvious functions of monitoring and controlling the process for reasons of safety and product specification. Additionally, there is invaluable information to be gained from the process parameters that can give an understanding of the current health of the asset.

Condition Monitoring has historically focused on the acquisition and analysis of measurable parameters that would give useful information as to the condition of machine components and, hence, a forecast of the likely serviceability of the machine.

The wider view of Condition Management must take into account

- the performance of the machine
- or the system of which it is a part
- And report on excursions away from previously defined acceptable tolerances.

Methods used to monitor the production process, such as inspecting, measuring and testing as required by the process

- inspection or test points (control points) in the process

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

1. Which one of the following is methods used to monitor the production process(5point)

A. Inspecting B. Measuring Testing D. All

Test II: Short answer

1. Define monitoring (5point)

_____

_____

_____

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

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

Information Sheet 3:- Operating the cooling process.

3.1.1 Operating the cooling process

Cooling is the removal of heat, usually resulting in a lower temperature and/or phase change. Temperature lowering achieved by any other means may also be called cooling.

- The functions of cooling are:
  - To remove specific and latent heat
  - To contract the chocolate such that it releases cleanly from the mold
  - To produce a stable and attractive product

- Types of cooling system there are two types of cooling systems:
  (i) Air cooling system and
  (ii) Water-cooling system

It is possible to calculate the heat load from the crystallizing fat in a typical molding plant cooler. By way of illustration, assume that the chocolate contains 30% fat, and that the tempered crystallizes 1% of that fat. The final stabilized solid fat content of the chocolate is measurable by NMR (Nuclear Magnetic Resonance) but in the UK 55% solid fat at 20 °C (68 °F) is typical. The cooler must then firstly remove the latent heat from a net 54% of the fat as it crystallizes.

In a molding plant running at 6t per hour this requires 46kw to be removed. In addition there are many other factors that will add to this theoretical heat load. These include the following:

- Specific heat from other ingredients e.g. milk, sugar etc.
- Centers or inclusions if any
- Molds, chains, mold frames
- Air leakage
- Conduction through the fabric of the cooler

❖ **Temperature**

Cooler conditions should be set on the basis of the temperature that the product needs to achieve. Apart from temperature settings, which are usually controlled and measured close to the heat exchange coils of the chiller plant, there are other factors such as track speed and air flow that need to be taken into account. It is usual to consider coolers as having three distinct temperature zones:

- Zone 1, which is mainly for specific heat removal, has temperature settings of 12-15 °C (54-59 °F). Product is in this zone, typically, for 5 min
- Zone 2, which is where the majority of the latent heat is removed. This will have lower temperatures than zone 1 and, potentially, a much longer time. Large units or bars will require 30-40 mints of cooling in zone 2. Typical temperatures are 7-10 °C (45-50 °F)
- Zone 3, where product is warmed prior to the exit of the cooler. The main purpose is to heat product to a temperature above the dew point of the packing room. Temperatures and times are typically the same as in zone 1

❖ **Residence time**

This is controlled by varying the track speed, usually measured in molds per minute. Large solid units require a longer cooling time than small thin units.

❖ **Humidity control**

It is vital to avoid any condensation forming on the product while in the cooling tunnel. Condensation will lead to sugar bloom, a surface defect due to sugar firstly dissolving in the condensation and then recrystallizing. It can, in extreme circumstances, cause molds or yeasts to begin growing on the chocolate surface. For these reasons, air in the cooling tunnels is dehumidified. Air simply cooled to, for example 13 °C (55 °F), will be saturated with water vapor (100% RH) at that temperature. In order to dehumidify the air, it is 'overcooled' to, for example 1.5 °C (35 °F), and then reheated to 13 Deg. This air then has a relative humidity of 45%. Dehumidification requires additional energy use and it is thus important that the process is optimized.

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 II. Say true/false

1. Humidity control vital to avoid any condensation forming on the product while in the Cooling tunnel (5point)

Test II. Choose the best

2. Which one of the following is function of cooling (5point?)

A. remove specific and latent heat
B. To contract the chocolate such that it releases cleanly from the mold
C. To produce a stable and attractive product
D. All

Test III: Short answer

1. Write the function of cooling(5point)

_____

_____

Note: Satisfactory rating ≥ 5 points Unsatisfactory - below 5 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 is the regular observation and recording of activities taking place in a production. It is a process of routinely gathering information on all aspects of the production the Periodic tracking (for example, daily, weekly, monthly, and quarterly, annually) of any activity's progress by systematically gathering and analyzing data and information is called Monitoring.

Workers to monitor the equipment's operation correctly and report tools/equipment malfunctions or problems according to procedures to his immediate supervisors. There are three basic categories of monitoring; technical monitoring, functional monitoring and business process monitoring.

Fig 1 processing equipment

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

1. What are three basic categories of monitoring (5point)?

A. Technical monitoring,

B. Functional monitoring

C. Business process monitoring.

D. All

Test II: Short answer

1. What is pre-start check(5point)

_____

_____

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

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

Information Sheet 5:-Identifying, rectifying and/or reporting out-of-specification product/process

5.1 Identifying, rectifying and/or reporting out-of-specification product/process

The term OOS (out of specification), is defined as those results of in process or finished product testing, which falling out of specified limits, that are mentioned in compendia, drug master file, or drug application. So, the OOS result occurrences have to be investigated and addressed.

OOS results may indicate a flaw in product or process design. For example, a lack of robustness in product formulation, inadequate raw material characterization or control, substantial variation introduced by one or more unit operations of the manufacturing process, or a combination of these factors can be the cause of inconsistent product quality. In such cases, it is essential that redesign of the product or process be undertaken to ensure reproducible product quality. The term out of specifications, are defined as those results of in process or finished product testing, which falling out of specified limits, that are mentioned in compendia, drug master file, or drug application

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 QC manager. Then the senior manager will ask QA for issuing OOS form to analyst. The designated personnel will classify the OOS as either assignable cause or non-assignable cause

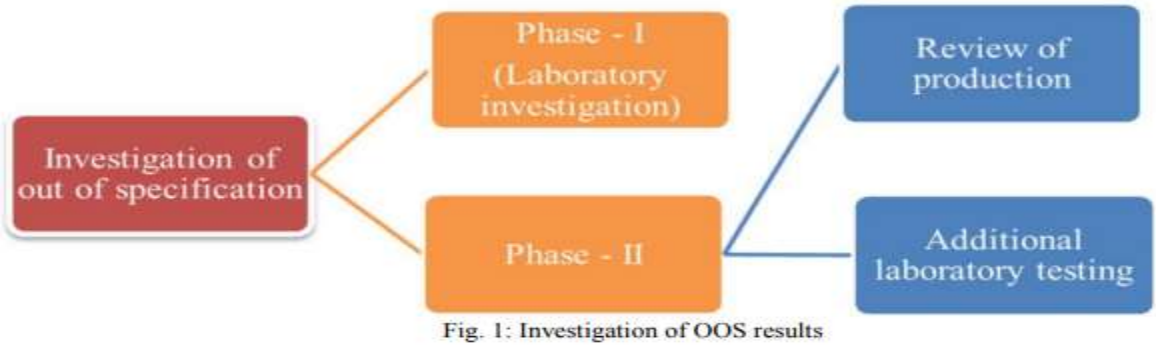

Fig. 1: Investigation of OOS results

Fig. 1 Specification of product/processes

The specifications of product have their own specification. Identifying and rectifying the processes and the products outcomes take place throughout the process and take actions when they occur, the processes or products will be out-of-specifications.

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: Choose the best answer

1. The reasons for OOS can be classified as assignable and non-assignable (5point)

Test II: Short answer

1. What is the term out of specification mean (5point)

_____

_____

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

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

Information Sheet 6:- Maintaining the work area

6.1 Maintaining the work area

Maintaining a clean workplace is vital for employers to reduce their workers compensation claims and keep efficiency high. When employees work in a messy environment, they may not notice all hazards, which increase the risk of an accident. 5S or good housekeeping involves the principle of waste elimination through workplace organization. 5S was derived from the Japanese words seiri, seiton, seiso, seiketsu, and shitsuke.

The plan also makes sure that work areas are not used as storage areas by having workers move materials to and from work areas as needed. Housekeeping order is "maintained" not "achieved." Cleaning and organization must be done regularly, not just at the end of the shift. Integrating housekeeping into jobs can help ensure this is done. A good housekeeping program identifies and assigns responsibilities for the following:

- clean up during the shift
- day-to-day cleanup
- waste disposal
- removal of unused materials
- inspection to ensure cleanup is complete

Poor housekeeping can be a cause of incidents, such as:

- tripping over loose objects on floors, stairs and platforms
- being hit by falling objects
- slipping on greasy, wet or dirty surfaces
- striking against projecting, poorly stacked items or misplaced material
- cutting, puncturing, or tearing the skin of hands or other parts of the body on projecting nails, wire or steel strapping

Effective housekeeping results in:

- reduced handling to ease the flow of materials
- fewer tripping and slipping incidents in clutter-free and spill-free work areas
- decreased fire hazards
- lower worker exposures to hazardous products (e.g. dusts, vapors)
- better control of tools and materials, including inventory and supplies
- more efficient equipment cleanup and maintenance
- better hygienic conditions leading to improved health
- more effective use of space
- reduced property damage by improving preventive maintenance
- less janitorial work
- improved morale
- improved productivity (tools and materials will be easy to find)

❖ Safety Before operation

- Short term training is necessary for the operators
- Become familiar with the safe operation of the equipment, operator must know the machine working principle and operation
- All operators should train. The owner of the machine is responsible for training the users.
- Check bolts and other loosen parts and tighten it before operation will start.
- When maintaining, inspecting, attaching and detaching parts, park the machine at flat and safe place.
- Use proper tools to maintain the machine and check working area is safe. During Operating

Only allow responsible person, who are familiar with the instructions, to operate

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 II: Say true/false

1. Housekeeping order is "maintained" not "achieved (3point**)**

Test I: Choose the best answer

1. What are the benefits of good housekeeping practices? (5point)
   - A. Tripping over loose objects on floors, stairs and platforms
   - E. being hit by falling objects
   - F. slipping on greasy, wet or dirty surfaces
   - G. All

Test III: Short answer

Write at least three effective housekeeping results (5point)

_____

_____

_____

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

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

Information Sheet 7:- Conducting the work.

7.1 Conducting the work.

Any work has conducted according to workplace procedure. Following workplace procedure has a contribution to maintain the quality the processed food. The work of monitoring quality of work outcome has its own parameters. The followings are keys in food processing (especially related to fruits and vegetable quality).

Work rules are a set of rules, usually established by one or more unions in an agreement with management, specifying the tasks to be done by each employee.

Good behaviors at work

Examples of positive workplace behaviors include:

- Championing company values.
- Cooperating with and collaborating with others.
- Welcoming new ideas.
- Being respectful of colleagues.
- Promoting healthy work/life balance.

the benefits of rules and regulations in business are that they protect the company. By protecting employees, you protect the company from lawsuits. Following rules and regulations help employees understand what is expected of them and what will happen if they violate the rules.

Fig 1 discussing about work conducts

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 II: Say true/false

1. Housekeeping order is "maintained" not "achieved (3point**)**

Test I: Choose the best answer

2. What are the benefits of good housekeeping practices? (5point)
   A. Tripping over loose objects on floors, stairs and platforms
   B. Being hit by falling objects
   C. Slipping on greasy, wet or dirty surfaces
   D. All

Test III: Short answer

Write at least three effective housekeeping results (5point)

_____

_____

_____

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

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

Information Sheet 8:- Maintaining workplace records.

8.1 Maintaining workplace records.

Workplace information may include to:

- standard operating procedures (SOPs)
- specifications
- production schedules and instructions
- manufacturers' advice
- standard forms and reports

❖ Maintenance and repair records contain information about each service performed on a piece of cold chain equipment, including make, model and location of the specific device, the date and time of the service provided, the name and title of the person who

Fig .1 manual work place record

Fig .2 computerise workplace record

❖ Analysis of these records can identify:

- ➢ common problems by model;
- ➢ spare parts most frequently used by model;
- ➢ number of repair /maintenance activities performed in a month by administrative area;
- ➢ service histories of individual devices;
- ➢ equipment operator training needs; and
- ➢ Cost–effectiveness of equipment maintenance and repair services.

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 II: Choose the best answer

1. Workplace Records can identify (5point)

A. Common problems by model;

B. Spare parts most frequently used by model;

C. Cost–effectiveness of equipment maintenance and repair services.

D. All

Test I: Short answer

1. Write at least three workplace information records (5points)

-

_____

_____

_____

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

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

Operation Sheet 1- Operating the cooling process

Procedure:

1. Use personal protective equipment/PPE
2. Check the equipment/ machine
3. Check cooling temperature and time
4. Monitor the equipment
5. Operate the cooling process

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

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

Task-1 cooling process

LG #81	LO #3 Shutdown the cooling 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 processing
- Identifying and reporting Maintenance requirements

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:

- Identify shutdown procedure
- Shut down the processing
- 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 Identifying shutdown procedure

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. Plant shutdown, or turnaround, is a temporary closure of a building to perform maintenance. The main activities should be preventative in nature with the focus on equipment inspections. This is the opportune time to replace worn-out or broken process materials and equipment at their useful end-of-life.

- Shutdown procedures may include but not limited to:
  - Cleaning (in some cases cleaning may be carried out by a dedicated cleaning Crew)
  - Follow steps that are stated in the work place

- The agenda items for the production coordination meeting include;
  - Safety first
  - Lock out Tag out procedures
  - Standard operating procedures
  - What systems are to be secured and by whom
  - How systems will be secured and by whom
  - Why will the systems be isolated or shut down
  - Who are the contact persons on the job site in case something goes wrong
  - Action plan in the event something goes wrong i.e.; back up materials on site
  - How long is the duration of the shutdown
  - Confirm when the shutdown will occur

Fig 1 Shutdown procedure

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/false

1. Cleaning may be carried out by a dedicated cleaning crew (5point)

Test II: Choose the best answer

1. Write Shutdown procedures (5point)

_____

_____

_____

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

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

Information Sheet 2:- Shutting down the processing

2.1 Shutting down the processing

Major shutdowns in process industries typically happen infrequently (every year or two) and take several days to complete. In general, these shutdowns should have two objectives:

1. To repair problems identified during previous major shutdowns, and
2. To inspect parts of the plant not accessible during operation in order to identify problems that will be repaired during future planned shutdowns

Some examples of shutdown objectives are:

- Zero harm to shutdown workforce
- Emergent work to be restricted to 10% of planned work
- Shutdown costs to be within budgeted costs
- Shutdown overrun to be less than 5%

Fig 1 Shutdown process

❖ The Key to Shutdown Maintenance Success

The key to successful shutdown project is to have a robust shutdown process in place. The shutdown maintenance process must be well documented, and be built on a solid foundation. And that foundation is the 5 phases of shutdown maintenance. Follow these closely and you are well on the way to a successful shutdown

Some key issues which must be addressed during the shutdown initiation phase are:

- Shutdown date
- Shutdown duration
- Overall Shutdown budget
- Shutdown objectives
- List of equipment to be taken offline
- Scope of work for equipment taken offline
- New equipment to be installed
- Equipment to be modified
- Who will manage the shutdown
- Who will execute the shutdown
- Key dates for each shutdown phase

The shutdown team must be identified and assembled as soon as possible after the previous shutdown. Normally the core team will consist of the following. Depending on the size of the plant, some roles may be done by the same person.

- Shutdown Manager
- Planner(s)
- Scheduler(s)
- Shutdown Coordinator

Flow diagram of shutdown maintenance

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

What are the key issues which must be addressed during the shutdown initiation phase (5point?)

A. Shutdown date
B. Shutdown duration
C. Overall Shutdown budget
D. All

Test II: Short answer

1. Write two objectives of shutdown process (5point)

_____

_____

_____

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

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

Information Sheet 3:- Identifying and reporting Maintenance requirements

3.1 Identifying and reporting Maintenance requirements

Maintenance points to observe include:
Maintenance refers to planned technical activities or activities carried out in response to a breakdown, to ensure that assets are functioning effectively, and require skills, tools and spare parts

When working with equipment and machinery (maintenance personnel), observe the following rules:

- Ensure that it cannot be started or operated by either disconnecting the means of starting or by isolation at the panel and/or the local stop.
- Always use the correct tools for the job.
- Before Keep chisels in good condition.
- Use the correct grade of protective visors or goggles.
- Do not manhandle heavy objects. Use lifting gear.
- Always replace belt guards and other safety shields.
- Always read carefully instructions carrying out any maintenance operation on specialized equipment
- Test turbidity of effluent on a regular basis and whenever the water quality or flow rate changes.

Plant maintenance shutdowns and turnarounds are the most expensive of all types of maintenance. Because of their high impact to plant production, as well as the high cost of parts and equipment, plant shutdowns require a dedicated shutdown team. A Plant Maintenance Shutdown is more similar in a lot of ways to a project, instead of regular maintenance.

- The main problem areas are related to.
  - poor design,
  - Variations in raw water quality,.
  - lack of maintenance,
  - inadequately trained operators,
  - inadequate process monitoring,
  - poor record-keeping and poor management

Preventative maintenance and operating procedures are necessary to ensure Satisfactory operation.

Fig 1 maintenance process

- **Corrective or breakdown maintenance**: this is carried out when components fail and stop working. Breakdown is common in many utilities in Ethiopia and occurs as a result of poor preventive maintenance
- **Preventive maintenance**: this is a regular, planned activity that takes place so that breakdowns are avoided. Examples of preventive maintenance would include servicing of equipment, inspecting equipment for wear and tear and replacing as necessary, cleaning and greasing moving parts of equipment, and replacing items

that have a limited lifespan. Preventive maintenance is important because it ensures that the asset fulfills its service life. It also prevents crises occurring and costly repairs (in terms of time and money) being needed.

- Maintenance plan in confectionery product processing includes
  - Maintenance activities and schedules
  - Maintenance costs and budget details
  - Staff resource and supply requirements
  - Staff roles and responsibilities
  - Contingency plan for staff and supply problems
  - Reporting requirements
  - Hazard and risk control measures
  - OHS procedures, personal protective clothing and equipment requirements
  - Environmental impact control measures

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/false

1**.** OHS procedures, personal protective clothing and equipment requirements Environmental impact control measures (3point)

Test II: Choose the best answer

1 The main problem areas of maintenance (3point)

A. poor design,

B. Variations in raw water quality,.

C. lack of maintenance,

D. All

Test III: Short answer

1. List the main problem areas of maintenance (4point?)

_____

_____

_____

Operation sheet 1	shutdown procedure of cooling machine

Procedure

Step 1: Check electric line breaker by testing electric equipment for our safety

Step 2. Clean internal and external part of cooling machine by recommended detergent.

Step 3: Cover cooling machine by plastic/other materials.

Step 4: Shutdown the cooling breaker from simple to complex

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 1 hour. The project is expected from each student to do it.

Task1 Shutdown the procedure

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