Confectionery Processing

Level-II

Based on Oct 2019, Version 2 Occupational Standards

Unit of Competence: - Operate a Chocolate Couching Process

Module Title: - Operating a Chocolate Couching Process

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Table of Contents

LG #76	LO #1- Making refined mass to meet operating

Instruction sheet

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

- Making refined mass to meet operating
- Identifying and confirming the Cleaning and maintenance status.
- Fitting and adjusting machine components and related attachments
- Checking and adjusting the couching and related equipment
- Carrying out Pre-start checks.
- Confirming the available service to meet operation requirements

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

- Make refined mass to meet operating
- Identify and confirm the Cleaning and maintenance status.
- Fit and adjust machine components and related attachments
- Check and adjust the couching and related equipment
- Carry out Pre-start checks.
- Confirm the available service to meet operation 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- Making refined mass to meet operating

1.1 Making refined mass to meet operating

Making refining is the final grinding all particles in the liquid chocolate together to produce an even extremely smooth in which no grit can be detected on ones tongue or pallet. Chocolate refining process of reducing the particle sizes of both cocoa solids and sugar crystals in finished chocolate.

Fig 1 refined chocolate

- The main objective of refining is to have small, malleable particles that finally become smooth, consistent chocolate liquor (something that is very different from a chocolate liqueur!).Ingredients are important for the final product. Chocolate refining the particle size of the dispersed (solid) phase of chocolate, particularly that of the largest particles must be sufficiently small so that the chocolate does not feel gritty when eaten. For example, dark chocolate is generally ground finer than milk chocolate.

Chocolate refining is affected by product type (milk, dark or Compound) the process (crumb vs. milk powder) and the ingredients (Granulated or powdered sugar). Ingredients may be mixed and then Ground (combined grinding) or ground then mixed (separate grinding). Chocolate refiner is as follows:

- Ice cream maker
- Vita Mix
- Cuisinart
- Blenders (many makes and models)
- Juicers (including the Champion, which is the only juicer we know of that will liquefy the cocoa nibs, but still doesn't touch sugar)
- The oh so romantic Mortar and pestle
- Ball mills (homemade they were just too expensive)
- Rock tumblers (with steel shot)

Fig 2 Chocolate Refiner Machine

Fig 2 Chocolate Refiner Machine

❖ **Chocolate refining procedure**

The first step in the refining process is to do an initial grind of the nibs to create a rough, bitter paste. Then add this paste to the melangeur (French for mixer). The melangeur accomplishes two goals:

1. It mixes the sugar with the cacao paste;
2. It begins breaking the cacao and sugar particles into a finer state.

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. Chocolate refining is affected by product type (4point)

Test II: Choose the best

1 _____is affected by product type (milk, dark or Compound) the process (crumb vs. milk powder) and the ingredients (Granulated or powdered sugar). (3point)

A. Chocolate refining

B. OHS C. A and B

Test III: Short Answer Questions (3point)

1. ----------the process of reducing the particle sizes of both cocoa solids and sugar crystals in finished chocolate

Answer

1._____

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

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

Information Sheet 2- Identifying and confirming the Cleaning and maintenance status

2.1 Identifying and confirming the Cleaning and maintenance status

2.1.1 Identifying Cleaning and maintenance status

Cleaning is designed to remove all visible dirt, soil, chemical residues and allergens From equipment, utensils and work surfaces. Cleaning is usually carried out in several Stages:-

- Removal of course and fine impurities by sieving;
- Removal of ferrous matter with magnets;
- Destining and removal of other high density particles; and
- Dust collection during several cleaning steps.

Fig 1 Cleaning

❖ Procedures of cleaning

Cleaning the couching machine

· Remove the mixer

· Set-up a water connection into the nozzle

· Place the tank sensor

· Turn on: prewarm, mixer, pump buttons

· Turn on the water and clean the tank using a paintbrush

· Connect the release point with a pipe and open the valve to discharge

❖ Maintenance

The technical meaning of maintenance involves functional checks, servicing, repairing or replacing of necessary devices, equipment, machinery, building infrastructure, and supporting utilities in industrial, business, governmental, and residential installations. Maintenance is the upkeep of all chocolate fittings and equipment to an exacting standard within the property so that all areas look consistently new and pristine.

Fig 2 maintenance process

❖ **Procedures of maintenance**

- Identify maintenance machine
- Prepare equipment which is used for maintenance purpose

- Shutdown the machine and start maintenance process

A standard maintenance procedure is a detailed list of steps that describes how to perform a maintenance task and is also a documented standard to which the job or task should be performed.

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: Say true/false

1. Maintenance is the upkeep of all furniture, fittings and equipment (4point)

Test II: Choose the best

1. Cleaning is usually carried out in several stages (3point)

A. Removal of course and fine impurities by sieving;

B. Removal of ferrous matter with magnets;

C. Destining and removal of other high density particles; and

D. Dust collection during several cleaning steps

Test III: Short Answer Questions (3point)

1. Define cleaning (3point)?

Answer

1._____

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 machine components and related attachments

3.1 Fitting and adjusting machine components and related attachments

3.1.1 Fitting machine components and related attachments

Fitting is processes such as lathe turning, milling, cutting, shaping, fitting of keys, couplings, bushes, shafts, mixer and bearings. 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 a small part, especially a standardized or detachable part of a device or machine.

Fig 1 fitting chocolate mixing equipment

❖ Purpose and importance of working with shaping machines

a. Construction of shaping machines
b. Tools for shaping

c. Preparation for working with shaping machines

d. Setting and operation of shaping machines

2) Care and maintenance of shaping machines

3.1.2 Adjusting machine components and related attachments

❖ Monitor and adjust process equipment to achieve required outcomes, including testing and adjusting viscosity and monitoring other control points as required to confirm process is within specification, such as:

- Ingredient addition sequence
- Mix times
- Temperature
- Amperage/work input

Fig 2 adjusting chocolate mixing equipment

❖ Mechanical shaping machines consist of the following major components

1 - Machine column (frame)

2 - Main gearing (gear train and oscillating slider crank mechanism)

3 - Ram

4 - Ram head with tool slide and tool post

5 - Machine table

6 - Saddle

7 - Table support

8 - Drive (electro-motor)

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. (4point)

Test II: Choose the best answer

1. One of the following Purpose and importance of working with shaping machines (3point)

A. Construction of shaping machines

B. Tools for shaping

C. Preparation for working with shaping machines

D. All

Test III: Short Answer Questions

_____1.Which one of the following processes such as lathe turning, milling, cutting, shaping, fitting of keys, couplings, bushes, shafts and bearings (3point)

A. Fitting B. Adjusting C. A and B

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

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

Information Sheet 4- Checking and adjusting the couching and related equipment

4.1 Checking and adjusting the couching and related equipment

4.1.1 Checking the couching and related equipment

Couching is a long process of intense mixing, agitating, and aerating of heated liquid chocolate. Couching redistributes the substances from the dry cocoa that create flavor into the fat phase. Air flowing through the conch removes some unwanted acetic, propionic, and butyric acids from the chocolate and reduces moisture. Couching redistributes the substances from the dry cocoa that create flavor into the fat phase. Air flowing through the conch removes some unwanted acetic, propionic, and butyric acids from the chocolate and reduces moisture. Couching is regarded as the endpoint or final operation in the manufacture of bulk chocolate, whether milk or dark. Couching phases

Fig 1 couching process

❖ There are three phases of chocolate couching:

- Dry couching: The mass is still crumbly and more like a powder

- Pasty/plastic phase: Much of the fat has been released and the mass gradually changes to a paste
- Liquefying: The last of the fat plus minor additions, such as emulsifiers and Flavors, are added and the chocolate becomes liquid

4.1.2 Adjusting the couching and related equipment

❖ Couching and related equipment may include to:

- Ingredient addition equipment
- Continuous or batch conches
- Conveyor systems

❖ Changes occur in chocolate during couching

Chocolate couching is not a precisely defined process and there are still elements of skill in producing a good flavor some chocolate with the right viscosity for making sweets. This article is an introduction to what goes on in the conch and demonstrates how complex a process couching is. A conch, so named because early versions were similar in shape to the seashell, is a mixer specifically designed for making chocolate.

Fig 2 Chocolate couching analyzing 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: Say true/false

1. Coaching redistributes the substances from the dry cocoa that create flavor into the fat phase (3 point)

Test II: Chose the best answer

1. _____a long process of intense mixing, agitating, and aerating of heated Liquid chocolate (3point)

A. Couching B. cooling Blanching D.A and B

Test III. Short Answer Questions

1. Write the changes that occur during couching(4points)

_____

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

Information Sheet 5- Carrying out Pre-start checks.

1.1. Carrying out Pre-start checks.

Pre-operational checks reduce the risk of injury to you and other employees. Improves the condition of the chocolate mixing, increase productivity. 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. The pre-operational check is important for the workers safety. It involves a daily check of the machines health. Any chocolate mixing machine that needs repairs, maintenance or is observed to be unsafe to operate has to be taken out until such repair or maintenance has been done.

Pre-start checklist inspection is to identify defects and safety hazards prior to operation.
The main aim of a pre-start checklist inspection is to ensure a piece of equipment is safe to use. Pre-start checks, such as inspecting equipment condition to identify any signs of wear selecting appropriate settings to achieve required particle size, cancelling isolation or lockouts as required, confirming that equipment is clean and correctly configured for processing requirements, positioning sensors and controls correctly, ensuring any scheduled maintenance has been carried out, and confirming that all safety guards are in place and operational

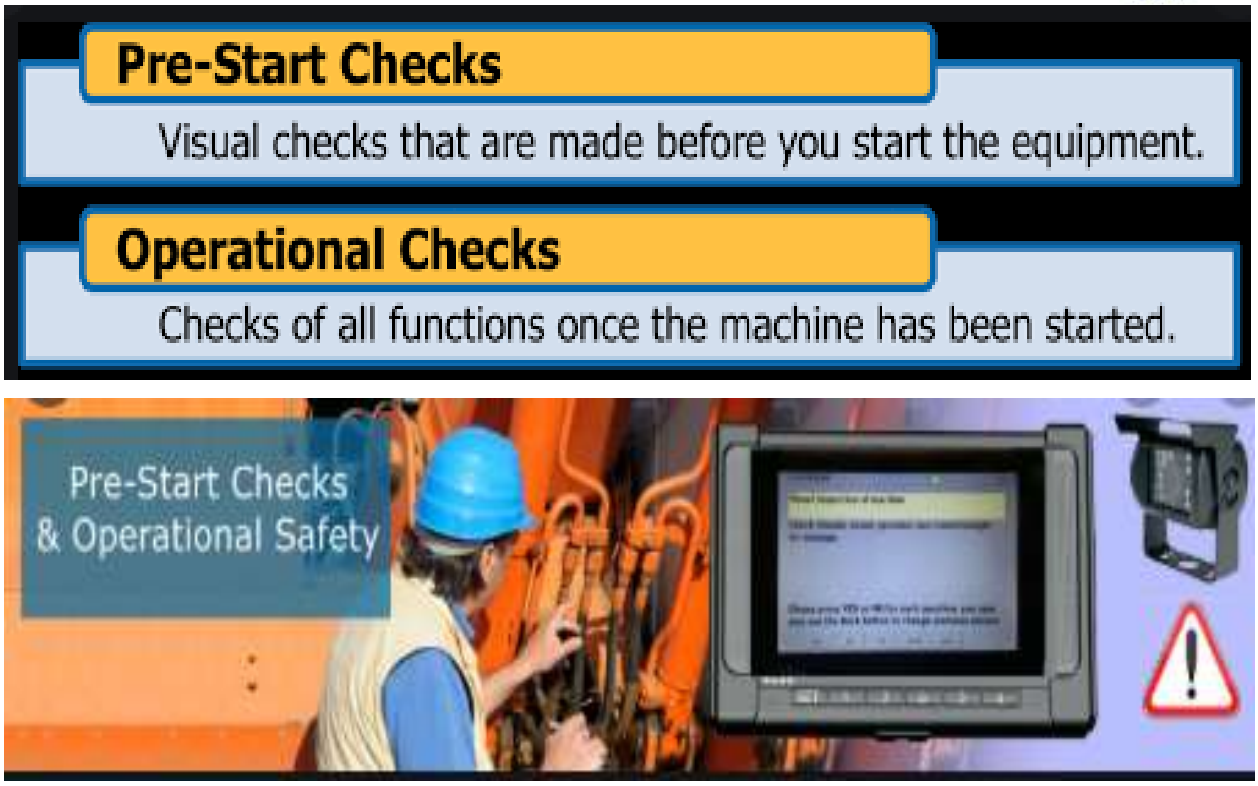

Fig1. pre-start check

- 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 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

1. Pre-operational checks: Reduces the risk of injury to you and other employees(3point)

Test II: Chose the best answer

1. Which one of the following is checking the safety devices procedure(3point)

A. Correct operation of the emergency stop button

B. Correct operation of the safety

C. A and B

Test III: Short answer

1. Write the aims of pre-start checks (4points)

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

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

Information Sheet 6- Confirming the available service to meet operation requirements

6.1 Confirming the available service to meet operation requirements of couching

❖ Services may include to:

- power

Where lighting is needed, florescent tubes use less electricity than bulbs, but care is needed when using fluorescent lights above couching, moulders and other equipment that has moving or rotating parts.

- Steam

Steam that comes into contact with food or food contact surfaces should be generated from potable water. Ice for use in food plants should be made from potable water and should be handled and stored to protect from contamination.

- water

is a liquid which used for confectioner processing and cleaning for chocolate machine

- compressed and instrumentation air

In chocolate production, compressed air is essential. Even the system of tubes for conveying the chocolate masses to the moulding equipment is controlled by pneumatically activated valves.

http://youtube.com/watch?v=4NxZZ_15CNw

Fig 1 chocolate processing machine

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**.** Steam is a service which is used for chocolate coaching (5point)

Test II: Choose the best answer

1. Which one of the following services used for operation requirements (5point)

A. Power B. stems C. Water D. All

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

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

Operation Sheet 1- Carrying out Pre-start checks of couching machine

Procedure

Step 1: Apply safety rules of laboratory (PPE)

Step 2: Prepare operation equipment and put in operating (checking) area.

Step 3: Check operating machine functionality

Step 4: Disinfect equipment by using recommended detergent

Step 6: Start the operation

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 Pre-start checks of couching machine

LG #77	LO #2- Operate and monitor the couching process.

Instruction sheet

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

- Starting and operating the couching process
- Monitoring operation of equipment and processes
- Identifying and reporting Variation of equipment maintenance
- Monitoring the process to confirm the specifications
- Identifying, rectifying and/or reporting out-of-specification product/process outcomes
- Maintaining the work area
- Conducting the work
- Recording and maintaining workplace 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:

- Start and operate the couching process
- Monitor operation of equipment and processes
- Identify and report Variation of equipment maintenance
- Monitor the process to confirm the specifications

- Identify, rectify and/or report out-of-specification product/process outcomes
- Maintain the work area
- Conduct the work
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Learning Instructions:

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Information Sheet 1- Starting and operating the couching process

1.1 Starting and operating the couching process

1.1.1 Starting the couching process

Couching is a key stage in the chocolate-making process. It affects mouth feel and texture and is also when all your other ingredients are added. And when it comes to couching, there are three key words: mixing, agitating, and cooking. The chocolatier will add all their other ingredients to the mix: sugar, cocoa butter, and – if they're using them – vanilla and lecithin. Then they will agitate the mix, constantly moving it and creating a small amount of heat through friction (which is why it's sometimes called cooking). Ingredients used in chocolate and those added during couching, such as ingredients in different types of chocolate as appropriate to production requirements and an understanding of the quality requirements and role of each main ingredient.

1.1.2 Operating the couching process

Couching is regarded as the endpoint or final operation in the of bulk chocolate, whether milk or dark .It is an essential process that manufacture contributes to development of Viscosity, final texture and flavor.

Fig 1 Operating the couching process

Moisture is reduced with removal of certain undesirable flavor-active volatiles such as acetic acid, and subsequently interactions between disperse and continuous phase are promoted. In addition to moisture and volatile acid removal, the couching processing promotes flavor development due to the prolonged mixing at elevated temperatures, giving a partly caramelized flavor in non-milk crumb chocolate. The process involves heating and mixing for several hours to several days the ingredients of chocolate - cocoa, cocoa butter, sugar, lecithin and any "flavoring" such as vanilla or essential oils.

Procedures of couching process

The process involves heating and mixing for several hours to several days the ingredients of chocolate - cocoa, cocoa butter, sugar, lecithin and and any "flavoring" such as vanilla or essential oils. For milk chocolate, dry milk powder is also included in the mix.

❖ **Effect of couching on aroma development**

Couching can be described as the working of chocolate flake and crumb into a fluid paste, coupled with flavor modification. Typically, couched chocolate is described as having a mellow flavor compared to an unquenched one. The bitterness is reduced, perhaps allowing other flavor notes to be more pronounced.

Fig2 couching process

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. Couching is a key stage in the chocolate-making process (3point)

Test II: Choose the

1. _____is a key stage in the chocolate-making process (3point)

A. Couching B. stems C. Water D. All

Test III: Write the short answer

1. Write the effect of couching on aroma development (4point)

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 operation of equipment and processes

2.1 Monitoring 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

2.1.1 Operation of equipment and processes may include to:

- use of process control panels and systems

❖ Methods used to monitor the couching process, including

- An understanding of viscosity testing procedures and other inspections and tests as required
- Inspection or test points (control points) in the process and the related procedures and recording requirements

❖ Goals of monitoring are to improve current and future management of outputs, outcomes and impacts.

Fig 1 Conching opiration process by screw mixing machine

Role of monitoring is viewed as a process that provides information and ensures the use of such information by management to assess project effects both intentional and unintentional – and their impact. It aims at determining whether or not the intended objectives have been met.

There are monitoring tools for servers, networks, databases, security, performance, website and internet usage, and applications**.**

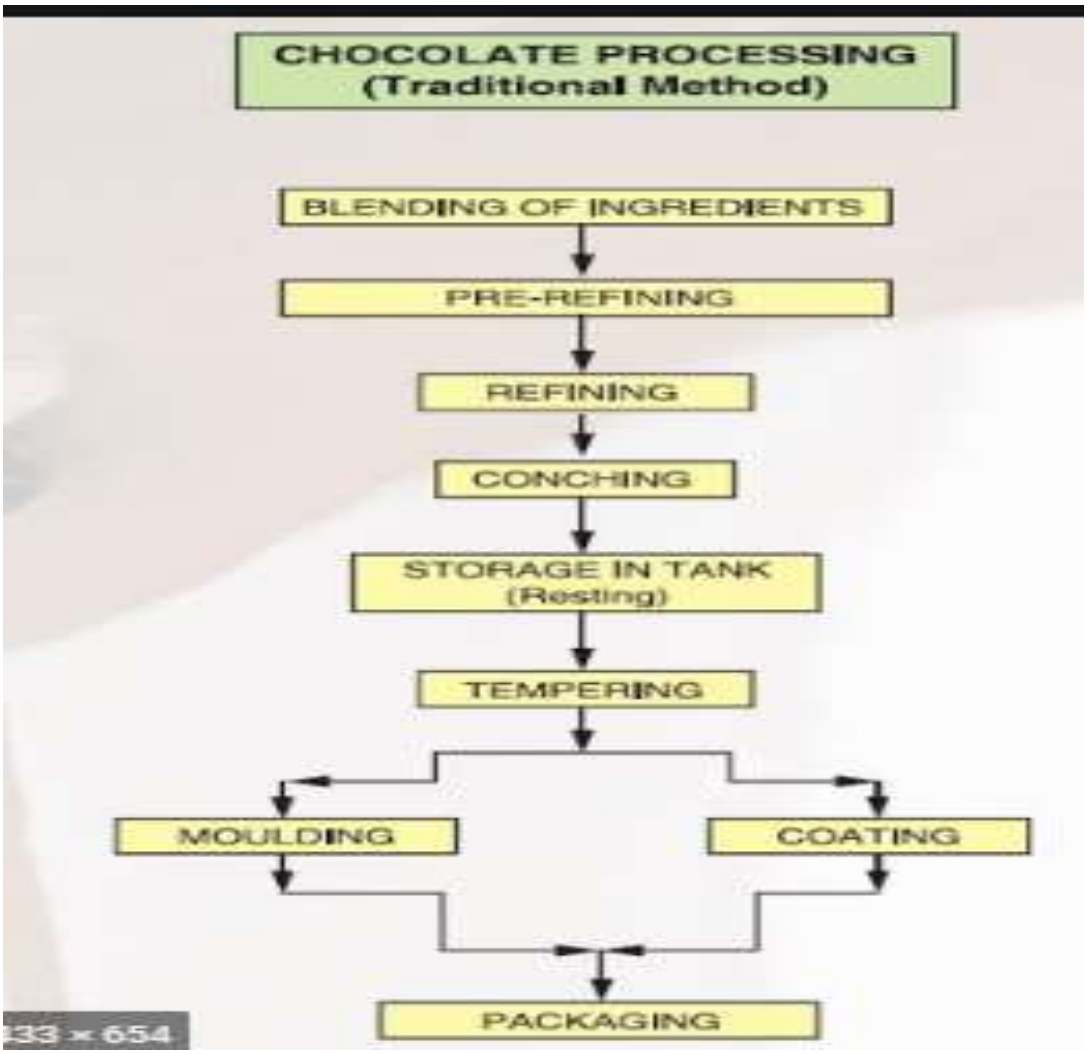

Fig 3 Chocolate couching process flow diagram

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: Say true/ false

1. Goals of monitoring are to improve current and future management of outputs, outcomes and impacts (3point)

Test II: Choose the best answer

1. Which one of the following is monitoring tools for servers (3point)?

A. Databases B. Security C. Performance D. All

Test III: Short answer

1. Write the methods used to monitor the couching process (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– Identifying and reporting Variation of equipment maintenance

3.1 Identifying and reporting Variation of equipment maintenance

3.1.1 Identifying Variation of equipment maintenance

The primary goal of an equipment maintenance and repair system is to eliminate or to avoid unnecessary or unplanned equipment downtime due to failure.

❖ Maintenance activities can be divided into two major categories:

1) Inspection and preventive maintenance (IPM)
2) Corrective maintenance

❖ IPM(Inspection and preventive maintenance)

Activities are scheduled to ensure equipment functionality and prevent breakdowns or failures. Inspections verify proper functionality and safe use of a device. Preventive maintenance activities are scheduled to extend the life of a device and prevent failure. Examples of these activities are calibration, part replacement, lubrication and cleaning. Inspection can be a stand-alone activity or can be conducted along with preventive maintenance to ensure functionality.

Fig 1 Identifying equipment maintenance Variation

❖ Corrective maintenance and unscheduled maintenance

- Are performed after there has been a failure of equipment.
- They are regarded as equivalent to the term repair.

❖ Maintenance system that is only able to react to equipment failures will probably not only result in higher total cold chain equipment costs but will also put vaccine potency and availability at risk.

- Corrective maintenance: The set of tasks is destined to correct the defects to be Found in the different equipment and that are communicated to the maintenance department by users of the same equipment.
- Preventive Maintenance: Its mission is to maintain a level of certain service on equipment, programming the interventions of their vulnerabilities in the most opportune time
- Predictive Maintenance: It pursues constantly know and report the status and operational capacity of the installations by knowing the values of certain variables, which represent such state and operational ability.
- Zero Hours Maintenance (Overhaul**):** The set of tasks whose goal is to review the equipment at scheduled intervals before appearing any failure, either when the reliability of the equipment has decreased considerably so it is risky to make forecasts of production capacity .
- Periodic maintenance (Time Based Maintenance TBM): the basic maintenance of equipment made by the users of it.
- To maintain this equipment is necessary to use predictive maintenance techniques that allow us to know the status of the equipment when is working, and scheduled shutdowns, which supposes a complete overhaul, with a frequency usually annually or higher.

3.1.2 Reporting equipment maintenance

Reporting maintenance equipment functionality. The aim should be zero breakdowns on this equipment; usually there is no time to properly address the issues that occur, being

desirable in many cases quick provisional repairs that will maintain the equipment working until the next overhaul.

Some of the equipment subjected to this type of maintenance is:

- Equipment and devices under pressure
- Installation of High and Medium Voltage
- Cooling Towers
- Certain lifts: service or people
- Vehicles
- Fire Prevention Facilities
- Storage tanks of certain chemicals

Fig1 reporting equipment maintenance

Self-check 3	**Written test**

Name…… ID…… Date…….

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

Test I: Say true / false

1. Predictive maintenance is used to maintain necessary equipment (3point)

Test II: Chose the best answer

1. Which one of the following types of maintenance(4point)

A. Corrective maintenance B. Preventive Maintenance C. Predictive Maintenance D. All

Test III: Short answer

1. Two major categories maintenance activities: (3point)

_____

_____

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 to confirm the specifications

4.1 Monitoring the process to confirm the specifications

Monitoring chocolate couching program or intervention involves the collection of routine data that measures progress toward achieving program objectives. It is used to track changes in program outputs and performance over time. It provides regular feedback and early indications of progress (or lack of progress). Its purpose is to permit the management and stakeholders to make informed decisions regarding the effectiveness of programs and the efficient use of resources

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.

Fig 1 monitoring the process

Process monitoring is conducted using checklists and guidelines. Those checklists are developed jointly with project staff. The same checklists and guidelines are used by field staff while implementing project activities.

Monitoring process of couching specifications

- Organic Cocoa Liquor
- Organic 100% Pure Unsweetened Chocolate
- Organic 72% Dark Chocolate (No Added Emulsifier, No Vanilla)
- Organic Coconut Blossom Sweetened Dark Chocolate (No Added Emulsifier, Coconut Blossom Sweetened, No Vanilla)

Traffic lights (Green, Amber, and Green) are usually applied for rating findings from the monitoring visits in couching The lights are explained below:


Activity implemented as per agreed standards and guidelines


Activity require minor improvement


Activity is not implemented as per agreed standards and guidelines the activity needs serious attention

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: Say true/ false

1. Process monitoring is conducted using checklists and guidelines (3point)

Test II: Chose the best answer

1. Which one of the following types of monitoring (2point)

A. Progress monitoring B. Progress tracking C. Progress validation D. All

2. Which one of the following is types of monitoring equipment Studies (2point)

A. Needs Assessment B. Baseline Study C. Periodic Assessment D. All

Test III: Short answer

1. Write at three types of monitoring equipment Studies (3point)

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 outcomes

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

5.1.1 Identifying out-of-specification product/process

The term out of specifications, are defined as those results of in process or finished coached product testing, which falling out of specified limits, that are mentioned in compendia, drug master file, or drug application. The OOS may arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When an OOS has arrived, a root cause analysis has to be performed to investigate the cause for OOS. The reasons for OOS can be classified as assignable and non-assignable. When the limits are not in specified limits, called out of specifications.

5.1.2 Rectifying out-of-specification product/process

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

5.1.3 Reporting out-of-specification product/process

Reporting OOS may arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. OOS (out of specification), results of in process or finished product testing, which falling out of specified limits, that are mentioned in compendia, confectioner file, or drug application. The OOS result occurrences have to be investigated and addressed. This article describes a typical procedure that can be adopted to handle OOS results.

❖ **Investigation (assignable cause) of out of specification results**

1) Check condition of the sample- Physical examination- Storage condition- Storage container- Labeling
2) Check balance& its calibration- ID no. of balance: - Calibration due date:

3) Check instrument calibration- Name of the instrument: - ID of the instrument:- Calibration due date:
4) Check the reagent used for analysis- Raw data, physical appearance, validity of reagent used.
5) Check the volumetric standard solution- Raw data, physical appearance, validity of standard solution used.
6) Check the indicator solution- Raw data, physical appearance, validity of indicator used.
7) Check for dilution, calculation, weighing, titer volume, readings
8) Check working standard- ID, Raw data, physical appearance, validity of working standard used
9) Check chromatograms and TLC plates
10) Check glassware for its accuracy and calibration
11) Check system suitability (HPLC / TLC

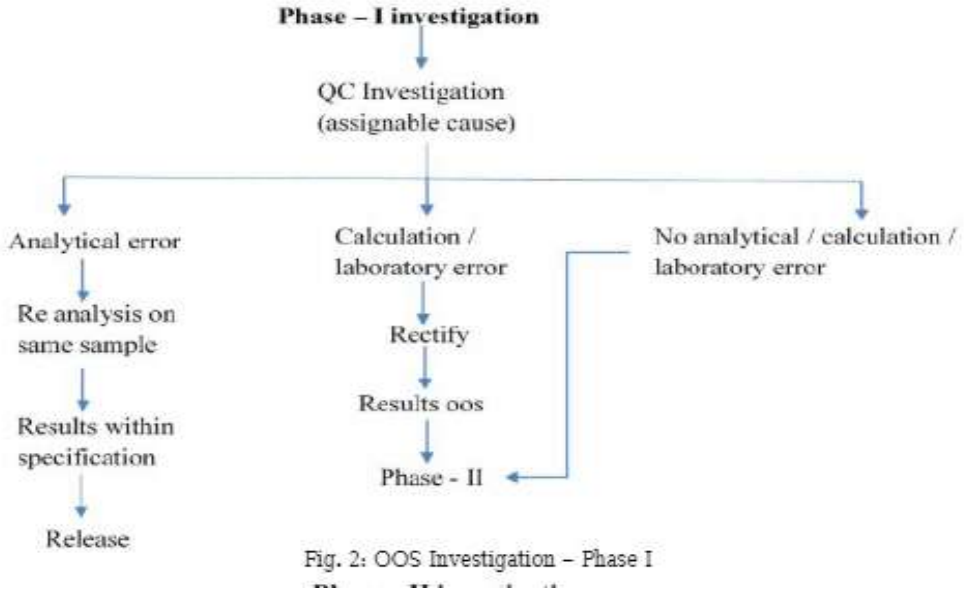

Fig. 2: OOS Investigation – Phase I

Self-Check 7	**Written Test**

Name…… ID…… Date…….

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

Test I: Say true/ false

The purpose of the laboratory investigation is to identify the cause for OOS result (5point).

Test II: Short answer

1. Define out of specifications (5points**).**

_____

_____

_____

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.

Fig 1 maintaining the work area

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

❖ Purpose of workplace housekeeping

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

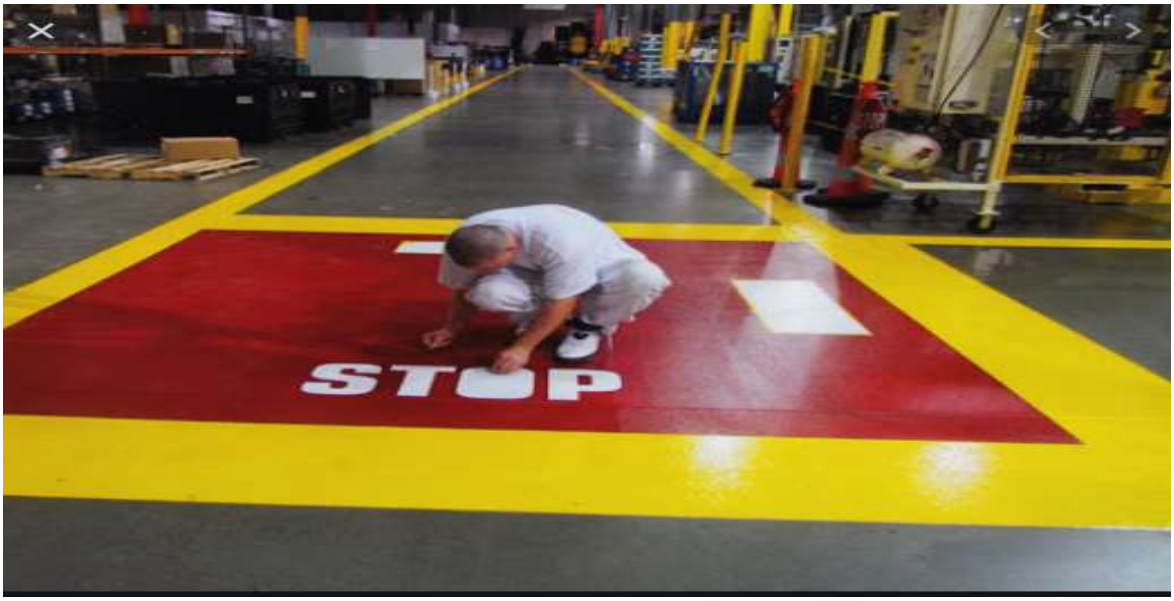

Fig 2 Good working and waking area

❖ Benefits of good housekeeping practices effective housekeeping results include:-

- 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)

❖ Elements of an effective housekeeping program

- **Maintenance**

The maintenance of buildings and equipment may be the most important element of good housekeeping. Maintenance involves keeping buildings, equipment and machinery in safe, efficient working order and in good repair.

- **Dust and Dirt Removal**

Enclosures and exhaust ventilation systems may fail to collect dust, dirt and chips adequately. Vacuum cleaners are suitable for removing light dust and dirt that is not otherwise hazardous .Dampening (wetting) floors or using sweeping compounds before sweeping reduces the amount of airborne dust. The dust and grime that collect in places like shelves, piping, conduits, light fixtures, reflectors, windows, cupboards and lockers may require manual cleaning.

- **Employee Facilities**

Employee facilities need to be adequate, clean and well maintained. Lockers may be necessary for storing employees' personal belongings. Washroom facilities require cleaning once or more each shift.

- **Surfaces**

Floors: Poor floor conditions are a leading cause of incidents so cleaning up spilled oil and other liquids at once is important.

- **Tools and Equipment**

Tool housekeeping is very important, whether in the tool room, on the rack, in the yard,. Tools require suitable fixtures with marked locations to provide an orderly arrangement.

- Waste Disposal the regular collection, grading and sorting of scrap contribute to good housekeeping practices.
- Storage Good organization of stored materials is essential for overcoming material storage problems whether on a temporary or permanent basis.

Procedures of maintaining cleaning

1. Remove general waste.
2. Clean & disinfect all flat surfaces.
3. Clean & disinfect restroom.
4. Dust mop floor:

5. Stock supplies and perform final inspection:
6. Wet Mop floor

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. Good organization of stored materials is essential for overcoming material storage (3point)

Test II: Choose the best

1. Elements of an effective housekeeping program (3point)

A. Maintenance

B. Dust and Dirt Removal

C. A and B

Test III: Short answer

1. Write at least three benefits of good housekeeping practices (4points**)**

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 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.

Conducive working environment is more than just ensuring a comfortable physical space; it is also about creating the 'heart ware'. Aim to strengthen office ties not just among employees. Employees are responsible for reporting any identified hazard in the work environment, facilities/amenities that they become aware of in accordance with guidelines.

Fig 1 conducting the work

- The work environment, facilities and amenities are provided for basic health and Welfare of employees, students, contractors and visitors.
  These include items such as:
  - Rest rooms

- Shelter sheds
- Seating
- dining rooms
- drinking water
- washing facilities
- change rooms
- lockers
- waste receptacles
- first aid facilities/rooms (refer to first aid guidelines)

Fig 2 conducting the work

❖ Work Environment

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

b. Entry and Exit Entries and exits are required to be safe to allow impeded access and egress for all workers, students and visitors including those with special needs. Entries and exits should be slip resistant under wet and dry conditions

Housekeeping Untidy workplaces may lead to injuries e.g. slips and trips, therefore good housekeeping practices are essential for all workplaces.

- Spills on floors should be cleaned up immediately
- Walkways should be kept clear of obstructions
- Work materials should be neatly stored
- Any waste should be regularly removed
- Suitable containers for waste should be conveniently located and regularly emptied.

❖ Work Areas the layout of the work area should be designed to provide sufficient clear space between furniture, fixtures and fittings so workers can move freely without strain or injury also evacuate quickly in case of an emergency. In determining how much space is required, the following should be considered:

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

❖ Environmental factors including heat or noise may require an increase to the space, as will work activities that involve manual tasks or the use of equipment. Floors and Other Surfaces floor surfaces shall be suitable for the work area and be chosen based on the type of work being carried out at the workplace.

Self-Check 7	**Written Test**

Name…… ID…… Date…….

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

Test I: Say true/ false

1. Conducive working environment is more than just ensuring a comfortable physical (3point)

Test II: Choose the best

1. Which one of the following is work Areas Layout (2point)?

A. The physical actions needed to perform the task

B. The need to move around while working

C. Whether the task is to be performed from a sitting or standing position

D. All

Test III: Short answer

1. Write at least three benefits of good housekeeping practices (5points**)**

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

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

Information Sheet *8* Recording and maintaining workplace information

8.1 Recording and maintaining workplace information

8.1.1 Recording workplace information

Workplace records are an important part of any work environment and should be accurately boiler maintained within the required timeframes

❖ Importance of workplace records

- For continuous monitoring of quality system
- For specimen tracking throughout process
- To identify failures in equipment
- To revisit information; reference
- For use as a management tool

❖ Workplace information may include to:

- Standard Operating Procedures (SOPs)
- Specifications
- Production schedules and instructions
- Manufacturers' advice
- Standard forms and reports

Fig 1 Recording workplace information

8.1.2 Maintaining workplace information

Work place information related to maintaining food quality may include:

- Standard Operating Procedures (SOPs)
- Quality specifications
- Food safety and/or Good Manufacturing Practice (GMP) codes
- Log sheets
- Basic data
- Standard forms
- written or verbal instruction

❖ Standard Operating Procedures (SOPs)

SOPs describe both technical and fundamental programmatic operational elements of an organization that would be managed under a work plan or a Quality Assurance (QA). SOPs detail the regularly recurring work processes that are to be conducted or followed within an organization.

❖ GMP (Good manufacturing practices)

GMP is guidelines for food processing and handling. GMPs include practices focused on the prevention and control of hazards associated with the fresh fruit and vegetable post-harvest chain, ensuring a safe and wholesome product.

1. Harvest containers and receiving area:-

- Remove as much dirt as practicable from harvest containers, trailers and boxes between harvest uses.
- This should be done outside the cleaning and packing facility and isolated from water source for processing.
- Containers that have been in direct contact with soil should be specifically marked and should not enter the receiving or packing area at any time.
- Use a second set of containers and handling boxes inside the facility and mark them specifically.

2. Proper cleaning procedures step by step

- Remove soil and dirt by dry-cleaning (brushing or air blowers).

- Initially wash with water to remove surface dirt (or dry-clean for delicate commodities).
- Wash with sanitizing agent (usually chemical disinfectant).
- Perform a final rinse with water.

3. Principal focus: Quality of washing and processing water

- Process and washing water must be free of microbial pathogens.
- Recycled water should be treated and maintained in proper condition.
- To ensure better product quality, keep water temperature low.
- Monitor temperature and quality of process water and keep it under control.

4. Correct sanitizing procedures

Sanitizing agents can only reduce microbial contaminants, not completely eliminate them.

Use oral communication skills/language competence to fulfill the job role as specified by the organization, including questioning, active listening, asking for clarification and seeking advice from supervisor

Fig 2 maintaining workplace information

Self-Check 8	Written Test

Name…… ID…… Date…….

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

Test I: Say true/false

1. GMP is guidelines for food processing and handling **(**3point)

Test II: Choose the best

1. Which one of the following is work place information (2point?)

A. Standard Operating Procedures (SOPs)

B. specifications

C. production schedules and instructions

D. All

Test III: Short answer

1. Define SOPs and GMPs (5 points)

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

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

Operation sheet - 2	Starting and operating the couching process

Procedure

Step 1: Apply safety rules of laboratory (PPE)

Step 2: Prepare chocolate couching operation equipment.

Step 3: Check operating machine functionality

Step 4: Disinfect equipment by using recommended detergent

Step 5: Check services (e.g. power, stem, water etc.)

Step 6: Read before starting couching process manual

Step 7: Start chocolate couching operation process

Chocolate making procedure

Step1 cleaning the seed

Step2 roasting

Step3 remove the shell

Step4 grounding the nibs

Step 5 separate cocoa from cocoa butter

Step6 add other ingredient to the chocolate

Step 7 knead the chocolate paste

Step 8 correct consistence

Step 9 prepare chocolate

http://youtube.com/watch?v=ZGkJGDWn0J8

http://youtube.com/watch?v=AhIF_V2Y7Zo

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 Start and operate the couching process

LG #78	LO #3- Shut down the couching process.

Instruction sheet

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

- Identifying shutdown procedure
- Shutting down the process.
- Identifying and reporting Maintenance requirements

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

- Identify shutdown procedure
- Shut down the process.
- Identify and report Maintenance requirements

Learning Instructions:

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

Information Sheet 1- Identifying shutdown procedure

1.1 Identifying shutdown procedure

A shutdown point is a level of couching operations at which a company experiences no benefit for continuing operations and therefore decides to shut down temporarily—or in some cases permanently. It results from the combination of output and price where the company earns just enough revenue to cover its total variable costs. The shutdown point denotes the exact moment when a company's (marginal) revenue is equal to its variable (marginal) costs—in other words, it occurs when the marginal profit becomes negative. A shutdown point can apply to all of the couching operations participates in/ just a portion of its operations.

1.1.1 Shutdown procedures may include

- Cleaning (in some cases cleaning may be carried out by a Dedicated cleaning crew)
- Follow steps that are stated in the work place

Fig 1 Shutdown procedure

❖ Couching dough mixer lock-out procedure

1. Shut off mixer at stop/start switch.
2. Shut off at disconnect behind mixer.
3. Apply lock to disconnect. Put key in pocket. Do not leave key in lock!
4. Attempt to start mixer, reset or return switch to “off” position.
5. Complete work on mixer.
6. Ensure bowl and mixer are clear of loose pieces, tools, etc.
7. Remove lock.
8. Restart mixer and run up to operating speed.

Shutdown equipment never uses any machine you have not been trained to use. Pull plug or throw switch to off position before cleaning or adjusting any machine. Keep fingers, hands, spoons, etc., away from moving parts. Wait until machine stops before moving food.

Shutdown equipment procedures includes:-

- Check all switches to see that they are off before plugging into the outlet.
- Particular care must be taken when cleaning the slicing machine.
- First pull the plug.
- Turn the gauge to zero in order to cover the edge of the blade
- Do not touch the edge of the blade
- Clean the blade from the center out.
- Clean the inside edge of the blade with a stick that has a cloth wrapped around one end.
- Do not start a mixer until the bowl is locked in place and the attachments are securely fastened.
- When using a mixer, turn off motor before you scrape down the sides of the bowl.
- Use a wooden or plastic plunger rather than your hands or spoons to push meat down into a meat grinder.

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 (3point)

1. Pull plug or throw switch to off position before cleaning or adjusting any machine

Test II: Choose the best

1. Which one of the following is dough mixer lock-out procedure (3point?)

A. Shut off mixer at stop/start switch.

B. Shut off at disconnect behind mixer.

C. Apply lock to disconnect. Put key in pocket. Do not leave key in lock!

D. All

Test III: Short answer

1. Write shutdown procedure (4 points)

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 process

2.1 Shutting down the process

Process Shutdown (PSD) is shutdown of all process system. PSD is activated automatically by various process sensors. PSD will shut down and isolate all related process equipment or systems, to limit the probability of an abnormal operating condition leading to emergency situation. Major shutdowns in process industries typically happen in frequently (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%

Fig1 Shutdown process

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

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. Say true/false

1. Major shutdowns in process industries typically happen infrequently (every year or two) and take several days to complete. (5point)

Test II: Short answer

1. Write at least three examples of shutdown objectives are (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 helps to protect the capital investment and ensures an Effective and economical expenditure in operating and maintaining the boiler facilities. Preventive maintenance is more economical and provides for reliability in operations of the boiler facilities**.** 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.

3.1.1 Identifying Maintenance requirements

- It should produce the maximum quantity of steam with the minimum fuel consumption.
- It should be more economical to install.
- It should be rapid to meet the fluctuation of load.
- It should be capable of quick Starting.
- It should occupy a small floor space.

Maintenance of production equipment in industrial enterprises plays an increasingly important role. It is quite obvious that it can eliminate a number of risks associated with the business and ensure effective use of financial resources necessary to ensure the working order of the machinery and equipment of the businesses.

The maintenance process enhances customer satisfaction that is often directly dependent on the reliability, flexibility and speed of suppliers. Preventive maintenance is more economical and provides for reliability in operations of the sewer facilities.

3.1.2 Reporting Maintenance requirements

Maintenance report details of each event in the time range, including the Setup/Takedown Time, Instructions, Event Time, Facility, Event, ID (Rental, Contract or Event), Service, and Customer.

❖ 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 those are necessary to ensure satisfactory operation.

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. Maintenance used to ensure that assets are functioning effectively, and require skills, tools and spare parts (3point)

Test II. Choose the best

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. _____ maintenance and procedures those are necessary to ensure

   Satisfactory operation (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	Shutting down the process

Procedure:

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

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

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

Step 4: Shutdown all lines of couching 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: Shutting down process of couching machine

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