Confectionary processing

Level-II

Based on May 2019, Version 2 Occupational standards

Module Title: - Operating a Chocolate Refining Process

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LG #43	LO #1- Prepare and mix ingredients

Instruction sheet

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

- Confirming and made available ingredient services.
- Entering mixing processing/operating parameters to meet safety
- Delivering ingredients and additives to the mixer
- Starting and operating mixing process
- Monitoring refining equipment
- Identifying, maintaining and reporting the variation in equipment operation.
- Monitoring the mixing process
- Identifying, rectifying and/or reporting out-of-specification product/process outcomes

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

- Confirm and made available ingredient services.
- Enter mixing processing/operating parameters to meet safety
- Deliver ingredients and additives to the mixer
- Start and operate mixing process
- Monitor refining equipment
- Identify, maintain and report the variation in equipment operation.
- Monitor the mixing process
- Identify,rectifyand/orreportout-of-specification product/process outcomes

Learning Instructions:

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

Information Sheet 1- Confirming and make available Ingredients and additives

1.1 Confirming and make available Ingredients and additives

1.1.1 Confirming and make available Ingredients

a) Eggs

Eggs are very important and a costly ingredient of bakery products especially cakes. Eggs furnish structure, moisture, flavour and colour in cakes. Eggs play a major role in the incorporation of air in foam type cakes and therefore in the resulting cake volume, grain and texture.

Freshness is a very important requisite of eggs for cake making**.**

Fig1.Egg

b) MILK

The functions of milk in cake making should be considered according to its two component parts:

- The milk solids part, which has a binding effect on the flour proteins, creating a toughening effect. Milk also contains lactose, which helps regulate crust colour. It adds richness and improves the flavour of cakes. It is an important moisture-retaining agent.
- The water in liquid milk part, which may be approximately 121/2-90% depending on the type of milk, has a number of functions. It is neither a toughener nor a tenderizer , but when combined with other ingredients may contribute to both toughness and tenderness.

Fig2 Milk

c) Leavening Agents:

A desired quality of cakes in lightness, or a high ration of volume to weight. Lightness in cakes is due to a large extent to the action of leavening agents, which bring about the evolution of gas during the mixing of the batter and in the oven. The air incorporated into a batter by whipping or creaming is a form of leavening; so is water converted to steam in the oven. Eggs and shortening that whip or emulsify are also parts of the leavening system**.**

d) Salt

Salt is used as an adjustment of sweetness and therefore contributes to flavour **.**

Fig 3. Salt

e) Flavouring Ingredients

Flavour extracts are solutions of the flavours in ethyl alcohol or some other solvents. The base of these flavours is the extracted essential oil of the fruit or bean. There are also a number of imitations flavouring ingredients available at present. Due to variation in strength of flavours, it is not possible to set any given amount to be used.

Flavouring agents seldom have any function other than to enhance the aroma and flavour of the cake**.**

f) Water

Water is present in sufficient quantity in cake batters to dissolve sugar , salt and other solid ingredients. Water adds moisture to the finished cakes and also regulates the consistency of the batter. It develops the protein in the flour to a very limited extent in order to retain better the gas produced by baking powder in the cake formula**.**

Fig 4. Ingredients

1.1.2 Confirming and make available Services

a) Lighting and power

Where lighting is needed, florescent tubes use less electricity than bulbs, but care is needed when using fluorescent lights above mills, dehullers and other equipment that has moving or rotating parts. This is because they can make machinery appear stationary at certain speeds, causing a hazard to operators.

Electricity is preferred for bakery ovens because it is clean, flexible and easily controlled. Electric motors should be fitted with isolators and starters. Plugs should be fitted with fuses that suit the power rating of the equipment and the main supply should have an earth-leakage trip switch. All electric wiring should be of the correct type for the intended purpose and installed by a qualified and competent electrician.

Where a three-phase (440 volt) supply is used in larger mills, the load should be equally spread over the three phases. Multiple sockets should not be used because they risk overloading a circuit and causing a fire.

b) Water supply and sanitation

Water is used in bakeries to make dough and for washing equipment. An adequate supply of potable (safe for drinking) water should be available from taps in the processing room.

There are two potential problems with the water quality: sand and contaminating microorganisms.

Self-check 1	Written test

Name…… ID…… Date…….

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

Test I: Say True or False (6 point)

1. Salt is used as an adjustment of sweetness and therefore contributes to flavour**..? (3pts)**
2. Eggs play a major role in the incorporation of air in foam type cakes and therefore in the resulting cake volume, grain and texture..? **(3pts)**

Test II: Choose the best answer (6 point)

1. **Which of the following Services are used in confectionary processing Plant? (3pts)**

   A) Power B) Water C) A & B D) All

2. **Salt is used as an adjustment of sweetness and therefore contributes to flavour Safet**y ?**(3pts)**

   A) Flavorings B) Salt C) Water D) Leavenings E) All

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

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

Information Sheet 2- Entering mixing processing/operating parameters to meet safety

2.1 Entering mixing processing/operating parameters to meet safety

Time, temperature and air flow are unique to each chocolate type and process. The control of these parameters will determine the outcome of the product, for example: harsh, mild or caramelized flavor. The processing parameters are:

a) Viscosity

Viscosity is typically measured using a viscometer in degree units. Different end uses for the chocolate will require different handling properties. The viscosity measurement will tell how thick or thin a product is.

- **plastic viscosity**

Yield value and plastic viscosity will help evaluate the flow characteristics of the product. Yield value is the force required to start the flow of chocolate and plastic viscosity is the force required to keep the chocolate flowing.

b) Particle size and pH

Particle size and pH were also measured for each sample. Majority particle size was found to be below 25 microns generally at all-time points beyond 8 hours, and pH for all samples had a mean of 5.25 with a standard deviation of 0.177. Analysis showed significant temperature

dependent p-values for several compounds, but significant time-dependent p-values were apparent for a greater number of compounds.

c) Temperature and Time

As normal practices in baking processes, too high baking temperature will cause crust color, lack of volume with peaked tops, close or irregular crumb, and probably all the faults due to under-baking. However, too low baking temperature will cause pale crust color, large volume and poor crumb texture. A good quality cake should have large volume with a fine uniform moist crumb besides having a good color and sheen, a good flavor, and the general appearance should be attractive, with a good eye appeal .

Fig 1Time

d) Airflow

Creates forced convection process that resembles the convection oven while the absence of airflow creates natural convection process that resembles the conventional oven or static oven. Presence of airflow affects the temperature distribution by evenly distributing the hot air inside the oven chamber rather than without airflow. Hence, the setting temperature can be reduced to get the same food quality because the heat flux in the oven chamber is larger.

e) Moisture content

The final moisture content is important in determining the quality of the cake. If too much water evaporates during baking process, the cake will become dry and is not preferable. A typical cake has moisture content between 15-30%, compared to bread 35-45% and biscuits 1-5%. In general, the moisture content was higher for cake baked in the presence of airflow compared to cake baked without airflow.

Fig 2Moisture Content

- **Process control**

Process control is an integral part of modern processing industries; and the food processing industry is no exception. The fundamental justification for adopting process control is to improve the economics of the process by achieving, amongst others, the following objectives:

(1) Reduce variation in the product quality, achieve more consistent production and maximize yield

(2) Ensure process and product safety

(3) Reduce manpower and enhance operator productivity

(4) Reduce waste

(5) Optimize energy efficiency

2.1.2 Measurement of Process Parameters

Measurement of Process Parameters as mentioned earlier, accurate measurement of the process parameters is absolutely critical for controlling any process. There are three main classes of sensors used for the measurement of key processing parameters, such as temperature, pressure, mass, material level in containers, flow rate, density, viscosity, moisture, fat content, protein content, pH, size, color, turbidity.

The three main classes of sensors used for the measurement of key processing parameters are:-

- **Penetrating sensors:** these sensors penetrate inside the processing equipment and come into contact with the material being processed.
- **Sampling sensors:** these sensors operate on samples which are continuously withdrawn from the processing equipment.
- **Non penetrating sensors:** these sensors do not penetrate into the processing equipment and, as a consequence, do not come into contact with the materials being processed.

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 or False (6pts)

1. Viscosity is typically measured using a viscometer in degree units…?(2pts)
2. The final moisture content is important in determining the quality of the cake…?(2pts)
3. As normal practices in baking processes, too high baking temperature will cause crust color…?(2pts)

Test II: Choose the best Answer (4pts)

1. …….is typically measured using a viscometer in degree units…?(2pts)

A) Temperature
B) Moisture Content
C) Airflow
D) Particle Size

2. Which of the following is categorized in to the processing parameters of confectionary process? (2pts)

A. Temperature

B. Moisture Content

C. Airflow

D. Particle Size

E. All

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

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

Information Sheet 3- Delivering ingredients and additives to the mixer

3.1 Delivering ingredients and additives to the mixer

3.1.1 Major ingredients

Major ingredients, also termed “bulk, “ingredients make up the majority of the formulation. Flour, for example, constitutes around 55 to 60% (formula weight) or more of bread’s raw materials. The **wheat flour** is the main ingredient in bread production. It is primarily responsible for bread Structure and bite characteristics.

Fig 1. Wheat Flour

3.1.2 Minor ingredients

Typically, range from 5-10% (formula weight), and micro ingredients are those added at 5% or less. The basic recipes for bread making include wheat flour, yeast, salt and water. If any one of these basic ingredients is missing, the acceptable product cannot be prepared. Other ingredients known as optional, for example, fat, sugar, milk and milk product.

Water transforms flour into viscoelastic dough that retains gas produced during fermentation and water provides medium of all chemical reaction to occur

- **The first processing operation** is :-

- To measure and place all dry ingredients in a bowl ready to create dough.
- These should be measured accurately to achieve the correct ratio.

- **When mixing the wet ingredients together**

- Use lukewarm water to dissolve the sugar and yeast.
- Leave in a warm place on the bench for 5 minutes; if it bubbles in the liquid, then the yeast is active and ready for use.

- Mix the liquid yeast mixture into the dry ingredients until a soft dough forms.
- Turn out onto a very clean and lightly floured bench and knead by hand for 10 minutes.
- The dough should be smooth and satiny.

You can test that it has been kneaded enough by pressing it with your finger and the dough should spring back and not leave an indent

Fig 2. Minor ingredients

Self-Check –3	Written test

Name…… ID…… Date…….

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

Test I: Say True or False

1. **Wheat Flour is Major ingredients in Bread making…..?(3pts)**
2. Mix the liquid yeast mixture into the dry ingredients until a soft dough forms…? **(3pts)**

Test II: Choose the correct Answer

1. **Which of the following is included in Major ingredients?(2pts)**

A) Salt

B) Color

C) Wheat

D) Flavor

E) All

2. **Which of the following is** included in the basic recipes for bread making..? **(2pts)**

A) **wheat flour**

B) **yeast**

C) **salt**

D) **water**

E) All

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

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

Information Sheet 4- Starting and operating mixing process according to workplace *policies and procedures*.

4.1 Starting and operating mixing process according to workplace *policies and procedures*.

- Before **beginning mixing/blending** make sure you are
- wearing clean clothes

Fig 1. Personal protective equipment

- your hair is tied back

Fig 2.tied hair

- your hands are washed

Fig 3.Hand Washing

- And you have no jewelry or nail polish on.

Fig 4.Remove Jewelry And Nail polish Free Hand

- Check all the equipment you will use is clean.

Fig 5. Good Wear

❖ **The first processing operation** is :

- To measure and place all dry ingredients in a bowl ready to create dough.
- These should be measured accurately to achieve the correct ratio.

4.1.1 Baking powder, pre-mixes and flavorings and colorings

a) Baking powder

Baking powder can be bought from grocery shops, but it may have lost some activity if it has been stored for too long. A baker should therefore make baking powder as needed, using acidic cream of tartar (acid calcium tartrate) and alkaline bicarbonate of soda (sodium bicarbonate) in the ratio of two parts to one. When water is added in the batter, the two components react to produce carbon dioxide.

b) **Pre-mixed dough improvers**

Pre-mixed dough improvers are becoming more readily available to bakers in Uganda via import agents. Bakers can make their own pre-mixed ingredients (e.g. by rubbing all dry ingredients in a recipe into the fat in bulk). This saves time during production and reduces the risk of any ingredient being forgotten in a batch of dough.

c) Flavorings

Flavorings are extracts, essential oils and essences. Extracts (e.g. vanilla) come from natural materials and are dissolved in alcohol. They give the most natural flavors and are often the most expensive. For expensive products, different types of alcoholic spirits and liqueurs, including rum and brandy may also be used to flavor cakes after baking. Spices can be used as spice oils (e.g. anise, cloves, coriander, cassia, cinnamon, caraway, ginger, mace and nutmeg) or ground powders.

d) Colorings

Colorings can also be obtained as either liquids or powders. Both types have intense color and should be carefully diluted before use to prevent streaks of color in the product.

❖ **Mixing the dry ingredients**

- Use lukewarm water to dissolve the sugar and yeast.
- Leave in a warm place on the bench for 5 minutes; if it bubbles in the liquid, then the yeast is active and ready for use.

❖ **Mixing dry ingredients with Wet Ingredients**

- Mix the liquid yeast mixture into the dry ingredients until a soft dough forms.
- Pour the water into a mixing bowl and stir in the dry ingredients with a wooden spoon until they are moistened.

Fig 6.mixing dry ingredients

❖ **Kneading the Dough**

- Turn out onto a very clean and lightly floured bench and knead by hand for 10 minutes.
- The dough should be smooth and satiny.
- You can test that it has been kneaded enough by pressing it with your finger and the dough should spring back and not leave an indent.

Fig 7.kneading dough

❖ Bread Dough Raise

- Once the dough is made, it needs to rise in a warm place.
- The temperature can be tested; room temperature if it's a warm day, or in the sun, or in the oven.

- The optimum temperature for dough to rise is 28-32 degrees Celsius.
- When you are waiting for the dough to rise, cover it with cling film.
- This stops any dust or flies contaminating the dough if left uncovered.
- Once the dough has doubled in size, it must be lightly kneaded again.

Fig 8.Bread Dough Raise

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 or False

1. Once the dough is made, it needs to rise in a warm place…? (2pts)
2. Flavorings are extracts, essential oils and essences…?(2pts)
3. The optimum temperature for dough to rise is 28-32 degrees Celsius…?(2pts)

Test II: Choose the Best Answer

1. **Before beginning mixing/blending** make sure you are…?(2pts)
   A) **Hand Washing**
   B) **Wear PPE**
   C) **Removed Jewlry**
   D) **All**
2. **Which of the Following is included in the first processing operation**s for **Making Bread?** (2pts)

A. To measure and place all dry ingredients in a bowl ready to create dough.
B. These should be measured accurately to achieve the correct ratio.
C. A & B
D. All

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

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

Information Sheet 5- Monitoring refining equipment

5.1 Monitoring refining equipment

5.1.1 Measurement of process variables.

In order to determine the degree of effectiveness of the different treatment processes, several physical and chemical parameters associated with equipment must be measured. After they are measured, the information must be evaluated so that necessary adjustments can be made in the treatment processes.

Controlling Equipment of plant processes may be controlled by manual, semiautomatic or automatic methods, which are defined as follows.

a) **Manual control**: Manual control involves total operator control of the various refining processes. The personnel at the processing plant observe the values of the different variables associated with the processing, and make suitable adjustments to the processes.

b) **Automatic control**: Automatic control involves the use of instruments to control a process, with necessary changes in the process made automatically by the controlling mechanisms. When a process variable change, the change is measured and transmitted to a control device which adjusts the mechanisms controlling the process.

c) **Semiautomatic control:** Semiautomatic control utilizes instruments to automatically control a function or series of functions within control points that are set manually. The operator manually starts the automatic sequence of operations.

5.1.2 Monitoring refining equipment throughout the job

Workers have to monitor the equipment's operation correctly and report tools/equipment malfunctions or problems according to procedures to his immediate supervisors. A finished product may exhibit several quality characteristics. Quality control (QC) techniques apply by inspecting and measuring the product quality characteristics using inspection equipment and some procedures. By comparing to the standard, the product can be identified whether conforms to requirements or fails, consider as accepted or rejected as well.

Inspection provides useful information about the current demonstrated product quality. Then, any managerial decision made based on this information, which is concentrate more on the effort of product and process improvement program. Many procedures, especially for acceptance inspection, has been developed to conduct the inspection which technically effective and/or economically efficient. Consistent monitoring on quality will ensure that products meet the requirements defined by either the manufacturer's product design department or by customers

Recognizing deviations of variables to be monitored include:

- Equipment performance (e.g. speed, output, variations)
- equipment component performance
- sequences and timing of operation
- materials changes (desired and not desired

❖ Deviations May include but not limited to:

- equipment production outputs
- equipment operating conditions

Operating parameters like temperatures and pressures. So, all these expected deviations has to be recognized monitored and reported

Bulk materials handling is an engineering field that is centered on the design of equipment used for the handling of dry materials. Bulk Materials are those dry materials which are powdery, granular or lumpy in nature, and are stored in heaps.

❖ **Overview of Material Handling**

Material handling (MH) involves “short-distance movement that usually takes place within the confines of a building such as a plant or a warehouse and between a building and a transportation agency.”

- It can be used to create “time and place utility” through the handling, storage, and Control of material, as distinct from manufacturing (i.e., fabrication and assembly operations), which creates “form utility” by changing the shape, form, and makeup of material.

5.1.3 Kneaders

Kneaders are closed operation units based on a self-cleaning mechanism. Nowadays, the kneaders are widely used in blister forming and extrusion forming as well as in chemical industry, rubber industry or pharmaceutical industry for various purposes. Recently, twin-screw kneaders, as one type of kneaders, are used more and more in polymer processing. The main functions of the twin-screw kneader are self-cleaning, conveying, mixing and melting, shearing, rolling. The core component of twin-screw kneader is one pair of intermeshing screw elements.

Fig 1.Geometry models of the screw rotors

❖ Continuous or batch kneaders:-

a) **Batch kneaders**

Batch kneaders are used for mixing powders and liquids to form a homogeneous wet mass; ideal for downstream process requires constant moisture levels.

b) **Continuous kneaders**

Continuous kneaders are mixes powders and liquids together continuously to form a homogeneous wet mass. Superior kneading action mixes ideal for continuous mixes ideal for continuous downstream process that require constant moisture levels.

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. Batch kneaders are used for mixing powders and liquids to form a homogeneous wet mass…?(3pts)
2. Continuous kneaders Mixes powders and liquids together continuously to form a homogeneous wet mass…?(3pts)

Test II: Choose the Best Answer

1. Controlling Equipment of plant processes may be controlled by..? (2pts)
   A. Manual
   B. Semiautomatic
   C. automatic methods
   D. All
2. Which of the Following is used in recognizing deviations of variables to be monitored..? (2pts)

A. Equipment performance (e.g. speed, output, variations)
B. equipment component performance
C. sequences and timing of operation
D. materials changes (desired and not desired
E. All

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

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

Information Sheet 6- Identifying, maintaining and reporting the variation in equipment operation

6.1 Identifying, maintaining and reporting variation in equipment operation

6.1.1 Identifying variation in equipment operation

Workers have to monitor the equipment's operation correctly and report tools/equipment malfunctions or problems according to procedures to his immediate supervisors. A finished product may exhibit several quality characteristics. Quality control (QC) techniques apply by inspecting and measuring the product quality characteristics using inspection equipment and some procedures. By comparing to the standard, the product can be identified whether conforms to requirements or fails, consider as accepted or rejected as well.

Inspection provides useful information about the current demonstrated product quality. Then, any managerial decision made based on this information, which is concentrate more on the effort of product and process improvement program. Many procedures, especially for acceptance inspection, has been developed to conduct the inspection which technically effective and/or economically efficient. Consistent monitoring on quality will ensure that products meet the requirements defined by either the manufacturer's product design department or by customers

Recognizing deviations of variables to be monitored include:

- Equipment performance (e.g. speed, output, variations)
- equipment component performance
- sequences and timing of operation
- materials changes (desired and not desired
  - ❖ Deviations May include but not limited to:
  - equipment production outputs
  - equipment operating conditions
  - Operating parameters like temperatures and pressures.so all these expected deviations has to be recognized monitored and reported.

6.1.2 Maintaining variation in equipment operation

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

Maintaining activities can be divided into two major categories:

a) Inspection
b) preventive maintenance (IPM)
c) Corrective maintenance

❖ IPM (Inspection 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.

❖ Corrective maintenance and unscheduled maintenance

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

6.1.3 Reporting Variation in equipment operation

❖ **Reporting systems**

The maintaining and repair of equipment should comply with policies, work plans, service-level agreements.

Compliance monitoring requires a reporting system that registers all maintaining and repair services and tracks equipment performance.

❖ Reporting systems will help immunization programmes:

- verify that maintenance services are performed as required
- build equipment maintenance and performance histories to help managers predict equipment performance problems

- identify common user errors that should be addressed with supportive supervision and training
- track and order spare parts
- plan equipment replacement schedules
- demonstrate the cost–effectiveness of maintenance services

Self-Check –6	Written test

Name…… ID…… Date…….

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

Test I: Choose the best Answer

1. By comparing to the standard, the product can be identified whether conforms to requirements or fails…?(2pts)
2. Preventive maintenance activities are scheduled to extend the life of a device and prevent failure…?2pts)

Test II: Choose the best Answer

1. Which of the Following is one of maintaining activities …?(2pts)

A) Inspection

B) Preventive Maintenance

C) Corrective Maintenance

D) All

2. Which of the following is **true** about Corrective maintenance and unscheduled maintenance …?(2pts)

A) Are performed after there has been a failure of equipment.

B) They are regarded as equivalent to the term repair.

C) A&B

D) All

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

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

Information Sheet 7- Monitoring the mixing process

7.1 Monitoring the mixing process

Monitoring refers to the routine measurements taken on the mixing/blending process that serve as indicators of whether the process is in a state of control.

(Or considered from the opposite point of view, serve as indicators that the process either is not or may not be in a state of control)

❖ **Why monitor the mixing Process?**

- Control over a mixing process can be demonstrated by a review of all relevant data at specified time increments.
  - ✓ Relevant data includes sample results and trending of those results.
- Monitoring the mixing processes ensures the process is performed correctly and also provides an early warning if it is not performing as validated.
- Provides additional reassurance to the visual assessment and conductivity verification that is performed with each mixing.

Consistent with the lifecycle approach to validation (Design, Formal Validation Studies, and Ongoing Controls) as well as continuous improvement for manufacturing quality and efficiency

❖ **Monitoring mixing Cycles**

- Temperature, flow, pressure, fluid level, drainage, mixing agent concentration, conductivity, and pH may play a role in monitoring the cleaning program and check amount of ingredients and additives added
- The nature of the mixing method will determine the critical parameters to be monitored during cleaning.
- Instrumentation for monitoring critical parameters should be accurate and subject to a routine calibration program.

❖ **Options for monitoring**

- Periodic Sampling
- Monitor Critical Operating Parameters (temperature, flow, pressure)
- Monitoring can occur using equipment that is in-line or off-line but ensure that it is accurate and in a routine calibration program.
- Mixing procedures should be monitored at appropriate intervals after validation to ensure that these procedures are effective when used during routine production.

Equipment cleanliness can be monitored by analytical testing and visual examination, where feasible.

❖ **Controls in the refining area**

Controls in the mixing/refining area are of critical importance for the proper formulation of chocolate. Further analysis of the liquor particles can also be performed by a particle size analyzer in the laboratory. With the proper fineness and fat release of the liquor, the manufacturer will be able to produce a quality chocolate economically.

❖ **Operators control the refining process**

Selecting the appropriate ingredients such as milk, chocolate liquor type, cocoa butter, and adding them correctly to the mixture will determine the final chocolate manufactured. Operators control the refining process and particle distance which contributes to the final fineness, color, mouth feel and texture of the finished product using hand held micrometers (by the refiner operators) and a particle size analyzer (in the laboratory) to determine the particle size distribution. The less fine particles that are in the product, the less cocoa butter required to reach the optimum viscosity needed by the customer.

After the product is refined, the conching process takes place. Time, temperature and air flow are unique to each chocolate type and process. The control of these parameters will determine the outcome of the product Yield value and plastic viscosity will help evaluate the flow characteristics of the product.

Self-Check – 7	Written test

Name…… ID…… Date…….

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

Test I: Say True or False

1. Monitoring refers to the routine measurements taken on the mixing/blending process that serve as indicators of whether the process is in a state of control…?(3pts)
2. Equipment cleanliness can be monitored by analytical testing and visual examination, where feasible…?(3pts)

Test II: Choose the best Answer

1. **Which of the Following is one of Options for monitoring….?**(3pts)

A) Periodic Sampling
B) Monitor Critical Operating Parameters (temperature, flow, pressure)
C) A & B
D) All

2. **Which of the Following is** may play a role in monitoring the cleaning program and check amount of ingredients and additives added…?(3pts)
   A) Temperature
   B) Pressure
   C) fluid level
   D) mixing agent concentration
   E) pH
   F) All

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

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

Information Sheet 8- Identifying, rectifying and/or reporting product/process outcomes

8.1 Identifying, rectifying and/or reporting product/process outcomes.

Identification of product/processes outcomes used to check either the products or processes are out of specification or not because every products or processes have their own specifications and have effects on the outcome after processing.

Main objective of Identifying and rectifying out-of-specification product/process outcomes in order to take corrective action in response to out-of-specification results

❖ Rectifying of product/processes outcomes.

The specifications of dough 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.

If the **over mixing** above the standard and **poor quality dough**

- Churning temperature is high decrease the temperature to10^0C
- Churn speed is high decrease the speed of the 60rpmI

If high **fat content** of butte produced

- Churning temperature is decreased adjust the temperature to 10^oC
- Churn speed is decreased adjust the speed of churner 60rpm

If high **yield, weak** and **leaky** butter produced

- Churning temperature is high decrease the temperature 10^0C
- Churn speed is high decrease the speed of the 60rpm

8.1.1 Reporting product/processes outcomes.

❖ **Reporting processes outcomes**

When a quality defect is found and documented, the technician assumes the role of quality control, which is to report the defect.

❖ This function usually contains four parts:

- Notification to others of the defect
- Follow-up to make sure the defect does not occur again,
- Documenting how the problem was fixed
- Changing the processing specification as needed.

❖ Notification to others of any defect can be simple or complicated.

- For instance, if the defect is just a matter of the slow speed of die, then a simple notification to the line operator will suffice (although if this is a constant occurrence, a different and elevated reporting procedure should be used).
- On the other hand, if the defect is a microbiological problem that has reached the customer, then multiple parts of the company must be notified, including ownership and top management.

Who and how to notify are defect specific and care should be taken by the technician to notify those people with a need to know but to limit the open discussion of product defects as a means to protect the brand.

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 or False

1. Non-conformance is identified after systematic evaluation and analysis of the root cause of the non-conformance..?(4pts)

Test II: Choose the best Answer

1. **If the over mixing above the standard and poor quality dough** …?(3pts)
   - **A)** Churning temperature is high decrease the temperature to100C
   - **B)** Churn speed is high decrease the speed of the 60rpmI
   - **C)** A$B
   - **D)** All
2. **Which of the following is one of Reporting systems will help immunization programmes…?**(3pts)
   - **A)** Verify that maintenance services are performed as required
   - **B)** Track and order spare parts
   - **C)** Plan equipment replacement schedules
   - **D)** Demonstrate the cost–effectiveness of maintenance services
   - **E)** All

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

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

Operation Sheet 1	Delivering ingredients to mixer

Basic procedure

Step 1 Combine the warm water, yeast, and 2 cups of fresh whole-wheat flour in a large mixing bowl.

Step 2 Allow to sponge for 15 minutes.

Step 3 Add the honey, oil, dough enhancer, and salt and 4 5 cups additional flour until the dough begins to clean the sides of the mixing bowl.

Step 4 Knead the bread by hand 7-10 minutes or until it is very smooth, elastic and small bubbles or blisters appear beneath the surface of the dough

Step 5 Form the dough into two loaves.

Operation Sheet 2- Starting and operating Refining process of Bread Making with work place procedures

Procedure

Step 1 Prepare Correct Recipe

Step 2 Mixing Ingredients

Step 3 Knead the Dough

Step 4 Recognizing when the Gluten is developed

Step 5 Raise the Bread (First rising-optional)

Step 6 Shaping the Bread Loaves

Step 7 Raising the Bread Loaves (second rising)

Step 8 Bake the Bread

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 Delivering ingredients to mixer

Task 2 Operating Refining process

‘

LG #44	LO #2- Prepare the refining equipment and process for
Instruction sheet	

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

- Making available the mix to meet operating requirements
- Identifying and confirming cleaning and maintenance
- Fitting and adjusting machine components and related attachments
- Entering processing/operating parameters
- 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**:

- Make available the mix to meet operating requirements
- Identify and confirming cleaning and maintenance
- Fit and adjusting machine components and related attachments
- Enter processing/operating parameters
- 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- Making available the mix

1.1 Making available the mix

Mixing (or blending) is a unit operation in which a uniform mixture is obtained from two or more components, by dispersing one within the other(s). It has very wide applications in many food industries where it is used to combine ingredients to achieve different functional properties or sensory characteristics.

- **Examples** include:-
  - Texture development in dough's and ice cream
  - Control of sugar crystallization
  - Aeration of batters and some chocolate products.

In some foods, adequate mixing is necessary to ensure that the proportion of each component complies with legislative standards (for example mixed vegetables, mixed nuts, sausages and other meat products).

- **Key mixing challenges**

Air incorporation and foaming is of the main challenges in mixing powders with liquids lies in preventing unwanted air and foaming. Air may be incorporated into a product by mixers with whipping action or when adding ingredients such as powder, which tends to trap air.

Fig Foaming and Air incorporation

❖ **Characteristics of Mixing Particles**

The mixing process is profoundly influenced by the flow characteristics of the particulate matter to be mixed. Recognition of the existence of two types of the particulate matter, free flowing and cohesive, forms the basis for classifying and characterizing mixtures and mixing processes. Differences in the physical properties promote mixing and demixing, and it has become practically impossible to foresee the point of best homogeneity.

The mechanism of mixing is the result of a complex hydrodynamics and rheological properties as well as of chemical and physical interactions between the components. The shape variations in powders are huge and they range from extreme degrees of irregularity to approximately spherical or well-defined crystalline shapes. Both physical and chemical properties of the material, geometry, size and surface characteristics of individual particles and the history of the system as a whole determine the bulk properties of fine powders.

❖ **Procedures Confectionary mixes**

Basic Cookie Making

Ingredients:

1 ½ cup Flour
½ cup Sugar
1 pc Egg
1 tsp Baking soda
1 tsp salt
½ cup butter/oil/margarine
1 tsp Vanilla

Procedures

1. Prepare wet ingredients
2. Prepare all the dry Ingredients (flour, baking soda, salt)
3. Mix wet & dry Ingredients
4. Form the batter into the thin baking sheet
5. Baked at 80^{o}C at 30 minutes

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: True or False

1. Mixing process is profoundly influenced by the flow characteristics of the particulate matter to be mixed…?(3pts)
2. Differences in the physical properties promote mixing and demixing….?(3pts)

Test I: choose the best answer

1. Ingredients to achieve different functional properties or sensory characteristics(4pts)
   A. Texture development in dough's and ice cream
   B. Control of sugar crystallization
   C. Aeration of batters and some chocolate products.
   D. All

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

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

Information Sheet 2- Identifying and confirming cleaning and maintenance

2.1 Identifying and confirming Cleaning

Cleaning removes and separates off-specification material, organic and non-organic debris, metals, and pesticide residues, among other contaminants, from the raw material prior to further processing.

- ❖ 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

Fig1. Cleaning Equipment's

- The main purpose of cleaning is to remove undesirable foreign material and it should be designed to obtain:

1. Complete removal of separated contaminants and avoidance of recontamination

2. Maximum separation efficiency consistent with minimum wastage of desirable material

3. Minimum quantity and concentrations of residues the foreign material found on fruits and vegetables can be grouped under the following headings:

2.1.1 Cleaning Methods

A) Dry cleaning

- **Cleaning methods**

a) Dry cleaning

Dry cleaning methods are used for products that are smaller, have greater mechanical strength and possess lower moisture content. The main advantages of dry cleaning methods are that, these methods are generally inexpensive and involve cheaper equipment than wet cleaning methods and produce a concentrated dry effluent which may be disposed of more cheaply but it suffers from various disadvantages such as, it is prone to production of dust, which can be a source of product recontamination and in some cases, a fire and explosion hazard.

The main groups of equipment used for dry cleaning are:

- Aspirators
- magnetic separator
- Separators based on screening of foods

b) Wet Cleaning

Wet cleaning is more effective than dry cleaning for removing soil from root crops or dust and pesticide residues from soft fruits or vegetables. It is also dustless and causes less damage to foods than dry methods. Different combinations of detergents and sterilizers at different temperatures allow flexibility in operation.

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

1. **Gross Clean/Preparation**

This step is most often omitted by food companies. This prevents effective cleaning of plant surfaces due to food residues remaining.

Negat**ive** impacts include:

- Protection of surfaces and bacteria from the action of detergents
- Reaction with and consumption of the detergent
- Holding bacteria and resulting in recontamination of the surface

2. Pre-rinsing

The purpose of this step is to remove deposits which cannot be easily removed by picking, scrapping or other manual form of gross cleaning. Excess water should be removed following pre-rinsing to avoid dilution of the detergent in the following step.

3. Detergent Application

The purpose of the detergent is to remove the layers of proteins, greases and other food deposits that remain on surfaces. Detergents are not designed to remove large pieces of food deposits or thick layers of fat. It is in these layers that bacteria can survive and grow and make the use of a disinfectant pointless.

4. Post Rinsing

The purpose of post rinsing is to remove the remaining food deposits. Care should be taken to minimize the amount of splash and aerosol formed which may re-contaminate surfaces. After

post rinsing the surface should be free of all visible deposits, layers of soiling and residues of detergent.

5. Disinfection

Disinfection should only be carried out on a visually clean, well rinsed surface, with minimal amounts of water. Direct food contact surfaces should be disinfected at least daily with other surfaces disinfected on a regular basis. Disinfectants should be used safely according to the supplier's instructions.

6. Terminal Rinsing

Most disinfectants are safe to leave on non-food contact surfaces without final rinsing. In some sections of the food industry there is a requirement to rinse food contact surfaces with water after disinfection.

Fig3 Cleaning Equipment's

1.2 Confirming Maintenance

- **Definition 0f Maintenance**

Maintenance can be defined as "a combination of technical, administrative and managerial measures during the life cycle of the object, focusing on its maintenance in the state or its return to the state in which it can perform the desired function". To ensure the maintenance of its own production equipment, companies build maintenance systems.

The maintenance system should perform mainly the following tasks:

- Identify the major types of repair works according to the nature of the equipment used and the operating conditions
- Identify the required period of repair works
- Identify the necessary amount of work based on the standards of maintenance labor
- effectiveness, the volume of material costs and minimizing downtime of production equipment
- Use modern methods of organizing repairs
- Establish an appropriate stimulation system based on the outcome of maintenance
- Ensure proper organization of material provision of maintenance

❖ **Types of maintenance**

a) **Preventive maintenance**

Preventive maintenance defined as an equipment maintenance strategy based on replacing, or restoring, an asset at a fixed interval regardless of its condition.

b) **Time-based maintenance**

Time-based maintenance refers to replacing renewing an item to restore its reliability at a fixed time, interval or usage regardless of its condition.

c) **Predictive maintenance**

Predictive maintenance where we use potentially many process parameters gained from online sensors to determine if our equipment is moving away from stable operating conditions and is heading towards failure.

d) **Corrective maintenance**

Corrective maintenance Is strategy only restores the function of an item after it has been allowed to fail.it is based on the assumption that the failure is acceptable (i.e. no significant impact on safety or the environment) and the preventing failure is either not economical or not possible.

Machine breakdowns arise from a number of different causes. They reduce productivity and increase production costs. Poorly maintained machines also produce substandard products and can contaminate products with metal fragments, as well as being a potential hazard to operators. To put preventive maintenance into practice, the following actions are needed:

- Identify priority machinery which have components that wear out more frequently

- Make a clear description of the procedures and standards for the work of machine operators and maintenance workers (such as lubricating, tightening bolts, adjustments etc.) In daily, weekly and monthly routine maintenance plans
- Organize a schedule and train staff to implement maintenance plans.
- Prepare a maintenance budget
- Record inspection results, analyses the records and evaluate the success of maintenance

Table 1 Types of contaminants

Types of contaminant	Examples
Metals	Ferrous and non- ferrous metals, bolts, fillings
Minerals	Soil, sand, stones
Animal	Hair, bone, insects, larvae
Plant	Leaves, twigs, weed seeds, pods, skins
Chemicals	Herbicides, pesticides, fertilizers
Microbial cells	Soft rots, fungal growth, yeasts
Microbial products	Colors, flavors, toxins

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Instruction: Say True or False

1. Preventive maintenance defined as an equipment maintenance strategy based on replacing, or restoring, an asset at a fixed interval regardless of its condition……..?(3pts)
2. Corrective maintenance is strategy only restores the function of an item after it has been allowed to fail……...?(3pts)

Instruction: Choose the best Answer

1. Reasons for Cleaning, including (3pts)

A. To meet specific customer requirements
B. To meet the requirements of global food safety standards (GFSI)
C. To maintain positive audit and inspection outcomes
D. all

2. The main groups of equipment used for dry cleaning are: (3pts)

A. Aspirators
B. magnetic separator
C. Separators based on screening of foods
D. All

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

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

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 up of refining Equipment

In setting machinery, the equipment should be located, if possible in a lighted dry place with plenty of room to work around it for cleaning and repairs. The arrangement should be that the minimum amount of sanitary piping is used, consistent with efficient operation. Related equipment may be grouped together to facilitate supervision. Straight-line flow of product is usually desirable. If possible allow space for unit machine to be added later when the business grows.

Machines especially the heavy ones, are set directly on the floor or on concrete base and grated in thoroughly with a rich cement mixture (1 part cement and 2 1/2 parts sand) and sufficient water.

3.1.2 Adjusting Refining equipment

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.

3.1.3 **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. The current state-of-health of process plant is important information related to current information, diagnosis and prognosis of various defects, and predicted useful life in the optimization of safety, quality and high production rates.

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.

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: Choose the best Answer

1. Which of the following is mostly affect machine and process characteristics…?(4pts)
   A) availability
   B) capacity
   C) quality
   D) safety
   E) All
2. Which of the following shows the current state-of-health of process plant is…? (4pts)
   A) Important information related to current information
   B) Diagnosis and prognosis of various defects
   C) Predicted useful life in the optimization of safety, quality and high production rates.

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

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

Information Sheet 4- Entering processing/operating parameters

4.1 Entering mixing processing/operating parameters to meet safety

4.1.1 Time, temperature and air flow

Time, temperature and air flow are unique to each chocolate type and process. The control of these parameters will determine the outcome of the product, for example: harsh, mild or caramelized flavor. During the conching cycle, cocoa butter, emulsifiers (lecithin) or flavorings may be added. The timing of these ingredient additions can greatly change the final product characteristics in terms of flavor and handling.

- **Viscosity**

The chocolate is now ready to be standardized for viscosity and fat content. During standardization, viscosity is typically measured using a viscometer in degree. Different end uses for the chocolate will require different handling properties. The viscosity measurement will tell how thick or thin a product.

- **plastic viscosity**

Yield value and plastic viscosity will help evaluate the flow characteristics of the product. Yield value is the force required to start the flow of chocolate and plastic viscosity is the force required to keep the chocolate flowing. Now we have made it through the chocolate processing and have a product ready for the manufacturer of the confectionery to make into his fine pieces. We have all the attributes necessary to guarantee a confectionery piece consumers will buy again and again.

4.1.2 Process control

Process control is an integral part of modern processing industries; and the food processing industry is no exception. The fundamental justification for adopting process control is to improve the economics of the process by achieving, amongst others, the following objectives:

(1) Reduce variation in the product quality, achieve more consistent production and maximize yield,

(2) Ensure process and product safety,

(3) Reduce manpower and enhance operator productivity,

(4) Reduce waste

(5) Optimize energy efficiency

4.1.3 Measurement of Process Parameters

Measurement of Process Parameters As mentioned earlier, accurate measurement of the process parameters is absolutely critical for controlling any process. There are three main classes of sensors used for the measurement of key processing parameters, such as temperature, pressure, mass, material level in containers, flow rate, density, viscosity, moisture, fat content, protein content, pH, size, color, turbidity.

- Penetrating sensors: these sensors penetrate inside the processing equipment and come into contact with the material being processed.
- Sampling sensors: these sensors operate on samples which are continuously withdrawn from the processing equipment.
- Non penetrating sensors: these sensors do not penetrate into the processing equipment and, as a consequence, do not come into contact with the materials being processed.

❖ Sensors can also be characterized in relation to their application for process control as follows [3]:

- Inline sensors: these form an integral part of the processing equipment, and the values measured by them are used directly for process control.
- Online sensors: these too form an integral part of the processing equipment, but the measured values can only be used for process control after an operator has entered these values into the control system.
- Offline sensors: these sensors are not part of the processing equipment, nor can the measured values be used directly for process control. An operator has to measure the variable and enter the values into a control system to achieve process control.

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 or False

1. During standardization, viscosity is typically measured using a viscometer in degree…?**(3pts)**
2. Penetrating sensors: these sensors penetrate inside the processing equipment and come into contact with the material being processed…? **(3pts)**

Test II: Choose the Best Answer

1. Which of the following is objective of Process Control…?(3pts)

A) Ensure process and product safety,

B) Reduce manpower and enhance operator productivity,

C) Reduce waste

D) Optimize energy efficiency

E) All

2. **Which of the following is Process** Parameter…?**(3pts)**

A) Time

B) Temperature

C) Air flow

D) All

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

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

Information Sheet 5- Checking and adjusting equipment performance

5.1 Checking and adjusting Refining equipment performance

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.

Keyword

- Equipment performance monitoring.
- Equipment condition assessment.
- Equipment health monitoring.

5.1.1 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. The current state-of-health of process plant is important information related to current information, diagnosis and prognosis of various defects, and predicted useful life in the optimization of safety, quality and high production rates.

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.

5.1.2 The Management Console

This is one of the user interfaces for using the Performance Monitoring Service.

Settings for the Performance Monitoring Service, such as which machines are monitored and which performance information is collected, are performed from the management console. The management console can also graphically display performance data. If you intend to use not System Monitor - Performance Monitoring Services but the Sigma System Center features to

manage a monitored machine, use the Sigma System Center Web console (described later) instead of the System Monitor - Performance Monitoring Services management console.

The management console is installed on the management server along with the Performance Monitoring Service. Users connect to the Performance Monitoring Service by starting the management console on the management server. More than one management console can connect to the same Performance Monitoring Service at the same time.

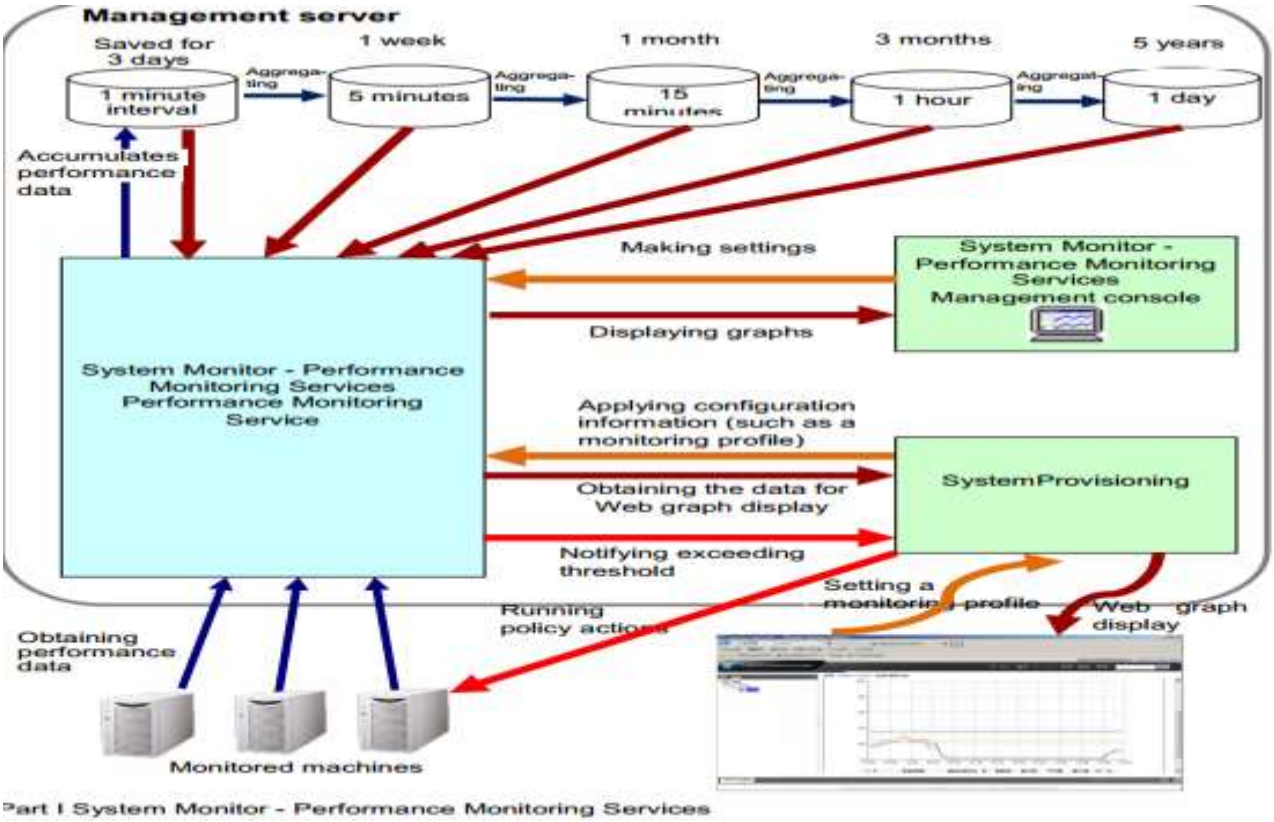

Fig 1.Management server

5.1.2 Adjusting Equipment Performance

- **Types of Performance Indicators and Collecting Intervals**

The Performance Indicators consist of "Resource", "Performance index" and "Instance". "Resource" is the target resource of the Performance Indicators, and includes CPU, physical disk and memory.

"Performance index" is the type of data collected, and indicates CPU usage and disk transfer rates. "Instance" identifies a particular measurement object in situations where a resource contains multiple measurement objects. "Instance" is unique to "Performance index". The settings for "Instance" cannot be changed.

Performance data is collected from monitored machines at regular intervals. These intervals are called "collecting intervals", and can be specified individually for each Performance Indicator item or collectively for all Performance Indicator items.

Performance Indicators that have been configured to collect data, begin collecting from monitored machines automatically when the Performance Monitoring Service starts.

Self-Check –5	Written test

Name…… ID…… Date…….

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

Test I: Say True or False

1. Measuring machinery health by performance monitoring has the potential to give warning of a developing failure…?(2pts)
2. Performance data is collected from monitored machines at regular intervals….?(2pts)

Test I: Choose the Best Answer

1. The wider view of Condition Management must take into account _____?(4pts)

A. the performance of the machine
B. the system of which it is a part
C. And report on excursions away from previously defined acceptable tolerances
D. All

2. One great benefit of performance monitoring electric motors is _____? (4pts)

A. to identify the frequency
B. And number of times that they are overloaded
C. A and B are Answers
D. None

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

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

Information Sheet 6- Carrying out pre-start checks

6.1 Carrying out a pre-start checks

It is important to carry out a series of checks before using a piece of machinery. This is particularly important in situations in which a number of people use the same machine. Larger companies and organizations usually have a system of checks, and a maintenance department that will deal with reported defects. Individuals working alone or in small teams will be responsible for checking and maintaining their own machines. Operator should be able to follow a checklist to ensure that they complete all the necessary checks

6.1.1 Pre-Start-Up Check procedures

- Corrosion resistant materials of construction are used for all equipment from the supply source to the membrane including piping, vessels, instruments and wetted parts of pumps
- Equipment is compatible with designed pressure
- Equipment is compatible with designed cleaning
- Equipment is protected against galvanic corrosion
- Media filters are backwashed and rinsed
- Ingredient addition points are properly located
- Check/anti-siphon valves are properly installed in Ingredient addition lines
- Provisions exist for proper mixing of ingredient in the feed stream
- Planned instrumentation is installed and operative.
- Instrument calibration is verified
- Pressure relief protection is installed and correctly set
- Interlocks, time delay relays and alarms are properly set
- Pressure vessels are properly piped both for operation and cleaning mode
- Millers are ready for operation: aligned, lubricated, proper rotation
- Fittings are tight

- Cleaning system is installed and operative

❖ **Preparation for start-up**

1. Electrical connections

The machine has only one connection to the main electricity supply

2. Hydraulic connections

The machine has only one hydraulic connection. The hose must have ½ “fastening.

❖ **DANGER:**

- Be sure that the values of the main electricity supply comply with the power specifications of the 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.

Instruction 1: Choose the Best Answer from the following Choices

1. **Which of the following Pre-Start-Up Check procedures?**

A) Equipment is compatible with designed pressure
B) Equipment is compatible with designed cleaning
C) Equipment is protected against galvanic corrosion
D) Media filters are backwashed and rinsed
E) All

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

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

Operation Sheet 1	Apply Cleaning Requirements on the Refining Equipment

Procedure:

Step 1 Gross Clean/Preparation

Step 2 Pre-rinse

Step 3 Detergent application

Step 4 Post-rinsing

Step 5 Disinfection

Step 6 Terminal rinsing

Operation Sheet 2	Basic Cookies Baking

Procedures

1. Prepare wet ingredients
2. Prepare all the dry Ingredients (flour, baking soda, salt)
3. Mix wet & dry Ingredients
4. Form the batter into the thin baking sheet
5. Baked at 80^{o}C at 30 minutes

Operation Sheet 3	Carrying out pre-start checks

Procedure

Step 1 Compatible Equipment with designed cleaning

Step 2 Protect Equipment against galvanic corrosion

Step 3 Backwash and rinse Media filters

Step 4 Locate Properly Ingredient addition points

Step 5 Check/anti-siphon valves are properly installed in Ingredient addition lines

Step 6 Provisions exist for proper mixing of ingredient in the feed stream

Step7 Install and operate Planned instrumentation.

Step 8 Verify Instrument calibrations

Step 9 Install and correctly set pressure relief protection

Step 10 properly set interlocks, time delay relays and alarms

Step 11 properly pipe pressure vessels both for operation and cleaning mode

Step 12 Align, lubricate, proper rotate millers are ready for operation.

Step 1 3 Tight fittings

Step 14 Install and operate cleaning system

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-1Apply cleaning on the Refining Equipment

Task-2 Baking Cookies

Task-2 Pre-start checks

LG #45	LO #3- Operate and monitor the refining 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 refining process
- Monitoring the operation of equipment and processes to identify variation
- Identifying , maintaining and reporting variation in equipment operation
- Monitoring the refining process
- Identifying, rectifying and/or reporting out-of-specification product/process outcomes
- Maintaining the work area.
- Conducting the work in accordance with legislative requirement /guidelines
- 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 refining process
- Monitor the operation of equipment and processes to identify variation
- Identify , maintain and report variation in equipment operation
- Monitor the refining process
- Identify rectify and/or report out-of-specification product/process outcomes
- Maintain the work area.
- Conduct the work in accordance with legislative requirement /guidelines
- 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 refining process

1.1 Starting and operating the refining process

Refining is a step processing of cocoa or chocolate which produce a smooth texture by reducing the size of the particles of cocoa mass from about80 – 90 microns to about 30 – 40 microns . At this point, the chocolate, which has the required ingredients mixed, still has rough texture, because it is a form of chocolate paste or chocolate liquor. Therefore, refining is necessary to turn the roughness into smoothness.

The smoother the chocolate desired, the more rolling milling required. Because of that, in order to ensure that its products qualities meet their expectations, it refines its chocolate paste to 19 micrometers while other major markets refine their chocolate to only 40 micrometers. The smaller micrometers they have are beneficial to the overall texture of the chocolate.

1.1.1 Refining process

The refining process has a certain parameters that can be changed that might alter the flavor. Refining is also will determine the size reduction of a chocolate mass as it is being manufactured. Whether a product is fine, medium or coarse ground will determine the pallet's flavor perception. The particles will be coated with fat, which the flavor carrier. When these particles enter the mouth, the melt, sweetness and mouth feel, and all will influence how the product taste.

- **Optimize particle size**

Refining of the cacao nib is necessary to produce chocolate liquor and reduce particle size. The paste is further refined to optimize particle size.

❖ **Chocolate Refining traditional technology**

Chocolate traditional technology includes a phase during which solid particle size is reduced. This phase, called refining, is carried out in a five roll mill with four of the cylinders placed one above the other and a feed cylinder placed on the side. The main aim of this operation is to reduce the sugar crystals and the cocoa solids to such a size as to make them small enough not to be detected on the tongue.

1.1.2 Raw materials mixing, Refining and Couching

❖ **Mixing Raw materials**

We have come to the point in the process where the raw materials used to manufacture chocolate are mixed together, refined and couched. Typically, the mass is fed to roller refiners where the particle size is reduced to the required fineness. A refiner is a series of rolls which reduce particle size of the incoming ingredients through the use of differential roll speed causing sheer.

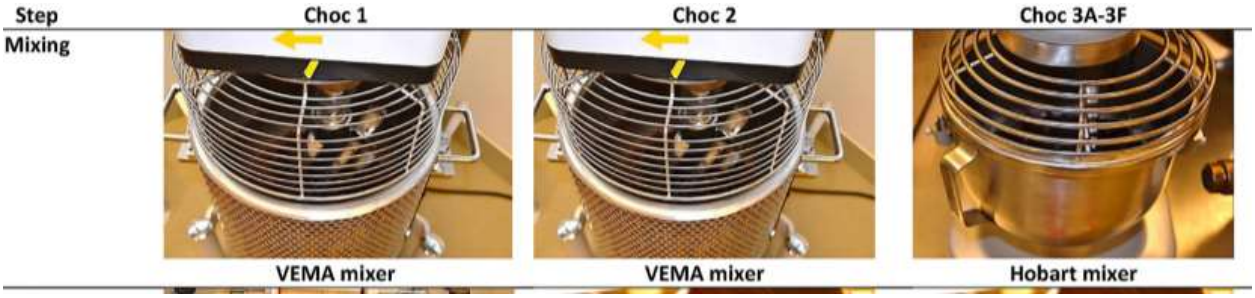

Fig1 Mixing Raw materials

❖ **Pre-refiners**

Pre-refiners are often used to condition the mass prior to the five roll refiners. The mass is introduced to the lower roller and moves up the rolls increasing the surface area and causing a dry paste or flake to come off of the refiner.

Fig2 Pre-Refiners

❖ **Conches**

Conching The chocolate is then conveyed to a conche. Conches are large mixers that input large amounts of mechanical energy into the chocolate mass. The resulting friction causes a shearing action and a rise in temperature.

Conches are time, temperature, and air controlled. Some of the benefits of conching are: •

- Improved rheology/reduction in viscosity—less cocoa butter needed
- Elimination of harsh volatiles to give a more mellow flavor
- Removal of moisture (reduces lumping and graining).

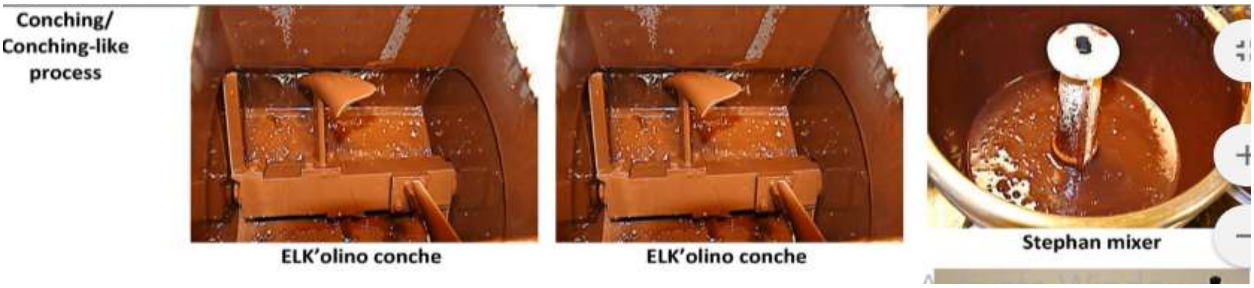

Fig3 Couching process

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 Or False

1. Refining is a step processing of cocoa or chocolate which produce a smooth texture by reducing the size of the particles of cocoa mass ..?(3pts)
2. Conches are large mixers that input large amounts of mechanical energy into the chocolate mass…?(3pts)

Test II: Choose the best answer

1. Which of the Following is Some of the benefits of conching …?(3pts)
   - **A)** Improved rheology/reduction in viscosity—less cocoa butter needed
   - **B)** Elimination of harsh volatiles to give a more mellow flavor
   - **C)** Removal of moisture (reduces lumping and graining)
   - **D)** All
2. Refining is also will determine whether a product is…? (3pts)
   - **A)** Fine ground
   - **B)** medium ground
   - **C)** coarse ground
   - **D)** All

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

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

Information Sheet 2- Monitoring the operation of equipment and processes

2.1 Monitoring equipment to identify variation in operating conditions

2.1.1 Measurement of process variables.

In order to determine the degree of effectiveness of the different treatment processes, several physical and chemical parameters associated with equipment must be measured. After they are measured, the information must be evaluated so that necessary adjustments can be made in the treatment processes.

Controlling Equipment of plant processes may be controlled by manual, semiautomatic or automatic methods, which are defined as follows.

A) **Manual control**
B) **Automatic control**
C) **Semiautomatic control**

Notice: Refer LO-1 for more Information

2.1.2 Monitoring equipment throughout the job

Workers have to monitor the equipment's operation correctly and report tools/equipment malfunctions or problems according to procedures to his immediate supervisors. A finished product may exhibit several quality characteristics. Quality control (QC) techniques apply by inspecting and measuring the product quality characteristics using inspection equipment and some procedures.

- **Inspection**

Inspection provides useful information about the current demonstrated product quality.. Many procedures, especially for acceptance inspection, has been developed to conduct the inspection which technically effective and/or economically efficient.

❖ **Consistent monitoring on quality**

Consistent monitoring on quality will ensure that products meet the requirements defined by either the manufacturer's product design department or by customers

Recognizing deviations of variables to be monitored include:

- Equipment performance (e.g. speed, output, variations)
- equipment component performance
- sequences and timing of operation
- materials changes (desired and not desired

❖ Deviations May include but not limited to:

- equipment production outputs
- equipment operating conditions
- Operating parameters like temperatures and pressures.so all these expected deviations has to be recognized monitored and reported.

Fig PLC Automatic Control/Touch Screen Control

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. Manual control involves total operator control of the various water treatment processes..?(2pts)

Test I: choose the best Answer

1. Which of the following included in important information about existing equipment appliances?(2pts)

A) Their functional status
B) Age and location
C) Net storage capacity.
D) All

2. Controlling Equipment of plant processes may be controlled by…..?(2pts)

A) Manual
B) semiautomatic
C) automatic methods
D) All

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

Note: **Satisfactory rating - ≥ 3 points** **Unsatisfactory - below 3 points**

Information Sheet 3- Identifying, maintaining and reporting variation in equipment operation

3.1 Identifying, maintaining and reporting variation in equipment operation

3.1.1 Identifying variation in equipment operation

Workers have to monitor the equipment's operation correctly and report tools/equipment malfunctions or problems according to procedures to his immediate supervisors.

Recognizing deviations of variables to be monitored include:

- Equipment performance (e.g. speed, output, variations)
- equipment component performance
- sequences and timing of operation
- materials changes (desired and not desired
  - ❖ Deviations May include but not limited to:
  - equipment production outputs
  - equipment operating conditions
  - Operating parameters like temperatures and pressures.so all these expected deviations has to be recognized monitored and reported.

3.1.2 Maintaining variation in equipment operation

Maintaining activities can be divided into two major categories:

a) Inspection
b) preventive maintenance (IPM)
c) Corrective maintenance

3.1.3 Reporting Variation in equipment operation

❖ **Reporting systems**

The maintenance and repair of equipment should comply with policies, work plans, service-level agreements.

Compliance monitoring requires a reporting system that registers all maintenance and repair services and tracks equipment performance.

❖ **Reporting systems will help immunization programmes:**

- verify that maintenance services are performed as required
- build equipment maintenance and performance histories to help managers predict equipment performance problems
- identify common user errors that should be addressed with supportive supervision and training
- track and order spare parts
- plan equipment replacement schedules
- demonstrate the cost–effectiveness of maintenance services

Notice: Refer above LO-1 for More Information

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: Choose the best answer

1. **Which of the following is category of Maintenance activities?(5pts)**

A) Preventive

B) Corrective

C) Inspection

D) All

2. **Reporting systems will help immunization programmes?** (5pts)

A) verify that maintenance services are performed as required

B) build equipment maintenance and performance histories to help managers predict equipment performance problems

C) identify common user errors that should be addressed with supportive supervision and training

D) All

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

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

Information Sheet 4- Monitoring the refining process

4.1 Monitoring the refining process

Monitoring **refining** may mean measuring a characteristic of the product or of the process to determine compliance with a critical limit. Monitoring may also involve observing if a control measure at a CCP is being performed.

❖ Measurement of Parameters in Refining Process are:-

• Measurement of cold-storage compartment temperature when critical for temperature-sensitive ingredients.

• Measurement of the pH of an acidifying ingredient when critical for the production of an acidified food.

• Measurement of line speed when critical to adequate cooking or chilling processes

4.1.1 monitoring Critical Limits and Control Measures

Monitoring must be designed to provide rapid (real-time) results. There is no time for lengthy analytical testing because critical limit failures must be detected quickly and an appropriate corrective action instituted before distribution. Physical and chemical measurements are preferred monitoring methods because testing can be done rapidly.

Physical and chemical measurements (e.g., pH, time, temperature) are Listed as follow:-

4.1.2 Parameters must monitored in refining process

a) Viscosity

Viscosity is typically measured using a viscometer in degree units. Different end uses for the chocolate will require different handling properties. The viscosity measurement will tell how thick or thin a product is.

- plastic viscosity

Yield value and plastic viscosity will help evaluate the flow characteristics of the product. Yield value is the force required to start the flow of chocolate and plastic viscosity is the force required to keep the chocolate flowing.

b) Particle size and pH

Particle size and pH were also measured for each sample. Majority particle size was found to be below 25 microns generally at all-time points beyond 8 hours, and pH for all samples had a mean of 5.25 with a standard deviation of 0.177. Analysis showed significant temperature dependent p-values for several compounds, but significant time-dependent p-values were apparent for a greater number of compounds.

c) Temperature

As normal practices in baking processes, too high baking temperature will cause crust color, lack of volume with peaked tops, close or irregular crumb, and probably all the faults due to under-baking. However, too low baking temperature will cause pale crust color, large volume and poor crumb texture. A good quality cake should have large volume with a fine uniform moist crumb besides having a good color and sheen, a good flavor, and the general appearance should be attractive, with a good eye appeal .

d) Airflow

creates forced convection process that resembles the convection oven while the absence of airflow creates natural convection process that resembles the conventional oven or static oven. Presence of airflow affects the temperature distribution by evenly distributing the hot air inside the oven chamber rather than without airflow. Hence, the setting temperature can be reduced to get the same food quality because the heat flux in the oven chamber is larger.

e) Moisture content

The final moisture content is important in determining the quality of the cake. If too much water evaporates during baking process, the cake will become dry and is not preferable. A typical cake has moisture content between 15-30%, compared to bread 35-45% and biscuits 1-5%. In general, the moisture content was higher for cake baked in the presence of airflow compared to cake baked without airflow. However, cake baked at middle temperature of 170°C with and without airflow showed lower moisture content compared to lower temperature and higher temperature, 160°C

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 or false

1. Monitoring may mean measuring a characteristic of the product or of the process to determine compliance with a critical limit..? (3pts)
2. Too high baking temperature will cause crust color, lack of volume with peaked tops…?(3pts)

Test I: choose the best answer

1. **Parameters must monitored in refining process are…?**(3pts)

   A) Viscosity

   B) Temperature

   C) Airflow

   D) Pressure

   E) All

2. Which of the following is normal practices in baking processes, too high baking temperature will cause ….?(3pts)

   A) Crust color

   B) Lack of volume with peaked tops

   C) Close or irregular crumb

   D) All

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

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

Information Sheet 5- Identifying, rectifying and/or reporting product/process outcomes

5.2 Identify rectify and/or report out-of-specification product/process outcomes

5.2.1 Identifying product/process outcomes

Identification of product/processes outcomes used to check either the products or processes are out of specification or not because every products or processes have their own specifications and have effects on the outcome after processing.

Main objective of Identifying and rectifying out-of-specification product/process outcomes in order to take corrective action in response to out-of-specification results

5.2.2 Rectifying of product/processes outcomes

The specifications of dough 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.

If the **over mixing** above the standard and **poor quality dough**

- Churning temperature is high decrease the temperature to10^0C
- Churn speed is high decrease the speed of the 60rpmI

If high **fat content** of butte produced

- Churning temperature is decreased adjust the temperature to 10^oC
- Churn speed is decreased adjust the speed of churner 60rpm

If high **yield, weak** and **leaky** butter produced

- Churning temperature is high decrease the temperature 10^0C
- Churn speed is high decrease the speed of the 60rpm

5.2.3 Reporting process outcomes

❖ **Reporting Refining Equipment Process Outcomes**

- Notification to others of any defect can be simple or complicated.

✓ For instance, if the defect is just a matter of the slow speed of die, then a simple notification to the line operator will suffice (although if this is a constant occurrence, a different and elevated reporting procedure should be used).

✓ On the other hand, if the defect is a microbiological problem that has reached the customer, then multiple parts of the company must be notified, including ownership and top management

Self-Check – 5	Written test

Name…… ID…… Date…….

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

Test I: Say true or false

1. Non-conformance is identified after systematic evaluation and analysis of the root cause of the non-conformance…?(3pts)
2. The corrective and preventive action is designed by a team that includes quality assurance personnel and personnel involved in the actual observation point of nonconformance…….?(3pts)

Test I: choose the best answer

1. Which of the following is True about compliance monitoring requirement……?(4pts)
   A) reporting system that registers
   B) maintenance and repair services
   C) tracks equipment performance
   D) All

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

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

Information Sheet 6- Maintaining the work area

6.1 Maintaining the work area

❖ Work Areas Housekeeping

Ensure that equipment and materials are placed carefully to avoid causing a fall or "striking against" accident. Clean up after every job. All spilt oil, grease or liquid must be cleaned up immediately. The closure of individual Work Permits must check for cleanliness and equipment/lose items removing.

Keep all machine motors and exhausts unobstructed. Clear work areas after each job and at the end of the day. Do not allow buildup of dusts and sand on structures, cable trays, shelves, ledges, or lockers.

Ensure that any place in lay down is safe and healthy and its surface shall be even and smooth and free from obstacle. Proper and easy means of access and egress shall be provided due to reach the good housekeeping state in lay down. A land of lay down that equipment's place there, shall be had good conditions concerning firmly and be in stable manner. Keep the lay down area safe and clean and place compatible equipment's together.

Adequate tools for handling of equipment's and stacking shall be provided until employees able to arrange any equipment safely and correctly. Equipment's shall be placed with proper horizontal distance in proper height. Regard to special housekeeping and cleanup of spillages in lay down is necessary for preventing from falling equipment's causing an accident. Ensure that all employees who perform any handling and maintenance activity have proper personal protective equipment's.

Self-Check – 6	Written test

Name…… ID…… Date…….

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

I. Choose the best answer from the following?

1. Which of the following is an individual SSOP should include? (5pts)

A) The equipment or affected area to be cleaned, identified by common name
B) The tools necessary to prepare the equipment or area to be cleaned
C) How to disassemble the area or equipment
D) The method of cleaning and sanitizing
E) All

2. Which of the following item is **not** used to assure sanitation? (5pts)

A) Alkaline steel wool
B) Detergent
C) Dry ice blast Sanitizer
D) Soap
E) Hazard F) All

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

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

Information Sheet 7- Conducting the work accordance with Legislative requirements/guidelines

7.1 Conducting a Work with workplace Environmental Guidelines

This describes the interpreting of schedules and plans, as well as a clear understanding of procedures to be undertaken and the targets to met.

When the requirements of the standards' met, employees understand the role their work

- plays, in maintaining quality output
- Motivated work force supports management in detecting, solving, correcting and preventing problems in the production area.
- Identification of the required resource
- Doing any work related with modern dairy production system we have to allocate the necessary resources which, proper and suitable to undertake the general work activities.

It is usually done within routines methods and procedures where some discretion and judgment is required in the selection of equipment and materials, organization of work, services, and actions to achieve outcomes within time and budgetary constraints should be properly allocated.

The resource, which allocated used to achieve the work. Some of the resources are, materials, tools and equipment, financials, labours, machinery, personal protective equipment, etc, have to be allocated so as to run the work properly

❖ **Develop Health and Safety Program**

A good, sound health and safety program is an effective way to manage risks and productivity in your operation.

- Accidents are not only costly in human terms, but they can disrupt the flow of work and halt production.
- There are always hidden costs.

- The actual injury to an employee is only the “tip of the iceberg”.A good health and safety program should include the following components:

❖ **Written Health and Safety Policy**

This simple statement shows your commitment to health and safety for all employees. It only needs to be a few sentences or a short paragraph.

❖ **Written Safety Rules**

A set of basic rules for your operation as well as specialized safety rules for specific tasks, equipment or processes need to be developed.

The list should not be long and unmanageable. Rules should be simple and easy to understand and may need to translate into a worker’s language.

The rules should be reviewed with all new employees, as well as posted for all employees to see

❖ **Safety Director/coordinator**

You need to appoint someone to look after safety as a part of their job. You may also want to have a safety committee or safety representatives from both workers and management. This will keep safety out front all the time.

❖ **Employee Training**

- Employees should receive periodic training as necessary to review safety procedures.
- New employees should receive safety training both before and on the job.
- Close -calls or accidents should trigger an immediate review of procedures and safety with employees.

❖ **Workplace Inspection**

- System of workplace inspection should be set up to review hazards and practices in the workplace.

❖ **Occupational safety and health(OHS)**

Occupational safety and health commonly referred to as occupational health and safety (OHS), occupational health, or workplace health and safety (WHS), is a multidisciplinary field concerned with the safety, health, and welfare of people at work. Occupational health is a multidisciplinary field of healthcare concerned with enabling an individual to undertake their occupation, in the way that causes least harm to their health.

Personal protective equipment can help protect against many of these hazards

A) Physical hazards

Physical hazards affect many people in the workplace. Machines have moving parts, sharp edges, hot surfaces and other hazards with the potential to crush, burn, cut, shear, stab or otherwise strike or wound workers if used unsafely.

B) Biological hazards

Biological hazards (biohazards) include infectious microorganisms such as viruses and toxins produced by those organisms such as anthrax. Biohazards affect workers in many industries; influenza, for example, affects a broad population of workers

C) Chemical hazard

Dangerous chemicals can pose a chemical hazard in the workplace. There are many classifications of hazardous chemicals, including neurotoxins, immune agents, dermatologic agents, carcinogens, reproductive toxins, systemic toxins, asthmagens, pneumoconiotic agents, and sensitizers.

D) Psychosocial hazards

Psychosocial hazards include risks to the mental and emotional well-being of workers, such as feelings of job insecurity, long work hours, and poor work-life balance

Name…… ID…… Date…….

Self-Check –7	Written test

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

1. Which one of the following are types of food business need to register most types of business will need to register including..? (4pts)

   A. Shop, catering business run from home B. Retailers C. Food manufacturing business D. All

2. Which one of the important food hygiene and safety considerations…?(4pts)

   A. Cleaning B. Cooking C. Chilling D. all

3. ……a Hazard which include infectious microorganisms such as viruses and toxins? (4pts)

A) Chemical Hazard
B) Physical Hazard
C) Biological Hazard
D) All

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

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

Information Sheet 8- Maintaining workplace records with accordance with workplace Information

8.1 Maintaining Workplace records

❖ **Work place information related to maintaining food quality may include**

- Standard Operating Procedures (SOPs),
- Specifications and production
- Quality specification
- Log sheets
- Basic data
- Standard forms
- Written and verbal instruction

❖ **Production records**

Recipes Raw materials and ingredients received and suppliers Wastage % at different stages of the process Stock levels for each ingredient Production volumes and measurements Maintenance programs and schedules

❖ **Quality assurance records**

Target amounts of ingredients and any changes made to recipe Measurements made at process control points Batch numbers and product code numbers Cleaning procedures and schedules

❖ **Sales records**

Names of customers and amounts sold to each Weekly and monthly sales volumes.

Documentation is the key to GMP (Good Manufacturing Practices) compliance and ensures traceability of all development, manufacturing, and testing activities. Documentation provides the route for auditors to assess the overall quality of operations within a company and the final product.

❖ **General requirements**

- Good documentation constitutes an essential part of the quality assurance system. Clearly written procedures prevent errors resulting from spoken communication, and clear documentation permits tracing of activities performed.
- Documents must be designed, prepared, reviewed, and distributed with care.
- Documents must be approved, signed, and dated by the appropriate competent and authorized persons.
- Documents must have unambiguous contents. The title, nature, and purpose should be clearly stated. They must be laid out in an orderly fashion and be easy to check. Reproduced documents must be clear and legible.
- Documents must be regularly reviewed and kept up-to-date. When a document has been revised, systems must be operated to prevent inadvertent use of superseded documents (e.g., only current documentation should be available for use).
- Documents must not be handwritten; however, where documents require the entry of data, these entries may be made in clear legible handwriting using a suitable indelible medium (i.e., not a pencil). Sufficient space must be provided for such entries.
- Any correction made to a document or record must be signed or initialed and dated; the correction must permit the reading of the original information. Where appropriate, the reason for the correction must be recorded.

8.2. Documentation system.

- Arrangements for the preparation, revision, and distribution of documents
- Necessary documentation for the manufacture
- Any other documentation related to product quality that is not mentioned elsewhere (e.g., regarding microbiological controls and product quality includes
  - specifications
  - sampling procedures
  - testing procedures and records (including analytical worksheets and/or laboratory notebooks)
  - analytical reports and/or certificates
  - data from environmental monitoring, where required
  - validation records of test methods, where applicable
  - Procedures for and records of the calibration of instruments and maintenance of

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: Short Answer Questions

1. **Maintenance and repair records** contain information about each service performed on a piece of equipment, including…?(5pts)

   A) Make, model

   B) Location of the specific device

   C) The date and time of the service provided

   D) all

2. Which of the following included in types of records? (5pts)

A) Production Records

B) Quality Control /Assurance Records

C) Financial Records

D) Sales Records

E) A & B

F) All

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

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

Lap Test	Demonstration

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.

LG #46	LO #4- Shut down the refining process

Instruction sheet

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

- Identifying the appropriate shutdown procedure
- Shut 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 the appropriate 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 the appropriate shutdown procedure

1.1 Identifying the appropriate shutdown procedure

Shut down/isolation means and includes isolation of mechanical, electrical drives, pipework (pressure) rotating equipment etc. utilizing electrical lock-off isolators, mechanical and power driven valves etc. in accordance with standard operating instructions.

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.

❖ Relevant regulations:

- Shut-down sequence is undertaken safely and to standard operating procedures.
- Machine/equipment is depressurized /emptied/de-energized/bled to standard operating procedures.
- Safe shut-down of machine/equipment is verified.
- Safety/security lock-off devices and signage are installed to standard operating procedures.
- Do not start a miller until the bowl is locked in place and the attachments are securely fastened.
- When using a miller, turn off motor before you scrape down the sides of the bowl.
- Machine/equipment is left in clean and safe stat
- When working with tools at height makes sure they cannot fall
- Do not leave power tools switched on when disconnected from their power as unexpected starting will occur when power is re-connected.
- Ensure that cables, power lines, pipes and hoses are not allowed to trail across gangways or work areas
- Check insulation, switches and fuse boxes for possible hazards. Ensure warning signs are clear and easily seen.

- Ensure that correct type of firefighting equipment
- Remove empty cartons, wrappings and other flammable waste as soon as possible
- Never use any machine you have not been trained to use.
- Check all switches to see that they are off before plugging into the outlet.
- First pull the plug.
- Turn the gauge to zero in order to cover 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.
- Never start a machine until you are sure all parts are in their proper places. If it is a machine that operates with gears, check the gear position.
- You must be aware of the lock-out procedures that are to be followed before repairing or cleaning any machine.
- Lock-out procedures must be clearly posted by management near each 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: Choose the best answer (4 pts.)

1. Which of the following are true about the relevant regulations for shut down water treatment equipment?

A. Shut-down sequence is undertaken safely and to standard operating procedures.

B. Machine/equipment is depressurized /emptied/de-energized/bled to standard operating procedures.

C. Safe shut-down of machine/equipment is verified.

D. Safety/security lock-off devices and signage are installed to standard operating procedures.

E. All

Test II: Short Answer Questions (8pts)

1. Define the meaning of Shut-down?

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

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

Information Sheet 2-	shutting down the process

2.1 Shutting down process

Shutting down process is the act of closing a factory or business or stopping a machine/Equipment either temporarily or permanently.

Reading, interpreting and following information on written job instructions, specifications and other applicable reference documents

- Checking and clarifying task-related information
- Entering information onto preforms and standard workplace forms.
- Shutting down machine/equipment.
- Purging/de-energizing equipment.
- Installing safety/security lock-off devices and signage

❖ Refining Equipment Shutdown Procedure

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

❖ Shutdown Refining Equipment Operational Procedures

According to manufactures or operational procedures and specification, workers should apply:

- Make sure power tools are properly grounded or are double insulated
- Switch off and unplug power tools before changing blades or servicing and repairing

- Wear appropriate personal protective equipment (PPE), such as glasses, goggles, dust masks, face shields, hearing protection, etc.
- Keep bystanders at a safe distance
- Keep all guards and shields in place
- Unplug and store tools after use
- Consider keeping power tools locked up to prevent unauthorized use
- Cleaning and other activities by turning off the equipment by unplugging a power or by pressing emergency button.
- In addition, after any cleaning and maintenance activity, equipment has to be put on and checked its functionality and if any deviations against SOPs.

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 or false

1. Shutting down process is the act of closing a factory or business or stopping a machine/Equipment either temporarily or permanentely..?(4pts)

Test I: Short Answer Questions

1. Which of the following is **not correct** about Turning on and off the equipment by the plant procedure**?** (3pts)

A) Make sure power tools are properly grounded or are double insulated
B) Switch off and unplug power tools before changing blades or servicing and repairing
C) Wear appropriate personal protective equipment (PPE)
D) Keep bystanders at a safe distance
E) Keep all guards and shields in place
F) None

2. **Which of the following is Performance Statements In achieving Shutdown Equipment**? (3pts)

A) Accurately input and set shutdown settings, process variables and services
B) Safely shut down the process system
C) Effectively protected against shutdown hazards
D) Effectively monitored shutdown and corrected faults and problems as appropriate
E) All

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

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

Information Sheet- 3	Identifying and reporting maintenance requirements

3.1. Identifying and reporting maintenance requirements

Maintenance is the upkeep of plant and machinery in proper working condition at all times

3.3.1 Maintenance of Refining process 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

❖ Enterprise requirements include

- Standard Operating Procedures (SOP),
- Industry standards and production schedules,
- Material Safety Data Sheets (MSDS)
- Legislative and licensing requirements
- Work notes, product labels and manufacturers specifications,
- Operator's manuals, enterprise policies and procedures (including waste disposal, recycling and
- Re-use guideline, and OHS procedures

Self-Check – 3	Written test

Name…… ID…… Date…….

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

Test I: Say True or False

1. Maintenance is the upkeep of plant and machinery in proper working condition at all times..?(4pts)

Test II: Choose the best answer

1. Which of the following are included in Maintenance plan in Milling/compression process? (4pts)

A) Maintenance activities and schedules
B) Maintenance costs and budget details
C) Staff resource and supply requirements
D) Staff roles and responsibilities
E) All

2. Which of the Following is Included in Enterprise requirements..? (4pts)

A) Standard Operating Procedures (SOP),
B) Industry standards and production schedules,
C) Material Safety Data Sheets (MSDS)
D) Legislative and licensing requirements
E) All

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

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

Operation Sheet 1	Shutdown Refining Equipment equipment's

Procedure

Step 1 Make sure power tools are properly grounded or are double insulated

Step 2 Switch off and unplug power tools before changing blades or servicing and repairing

Step 3 Wear appropriate personal protective equipment (PPE), such as glasses, goggles, dust masks, face shields, hearing protection, etc.

Step 4 Keep bystanders at a safe distance

Step 5 Keep all guards and shields in place

Step6 Unplug and store tools after use

Step 7 Consider keeping power tools locked up to prevent unauthorized use

Step 8 Cleaning and other activities by turning off the equipment by unplugging a power or by pressing emergency button.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 8-12 hours.

Task 1: Shutdown Refining Equipment

Reference Materials

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