Cereal processing

Level-II

Based on October 2019, Occupational standards Version 2

Module Title: Operating a Proving and Forming/Shaping Process

LG Code: IND CRP2 M14 LO (1-4) LG (44-47)

TTLM Code: IND CRP2 TTLM 1020 V1

October, 2020

Table of Contents

LG 44	LO 1- Prepare the proving equipment and process for operation

Instruction sheet

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

- Supplying dough to the prover for production/batch requirements.
- Identifying and confirming Cleaning, maintenance and service and status.
- Workplace policies and procedures**.**
- Fitting and adjusting machine components and related attachments.
- Entering Processing/operating parameters required to safety and production
- Checking and adjusting Equipment performance
- Carrying out pre-start checks with workplace information

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

- Supply dough to the prover for production/batch requirements.
- Identify and confirming Cleaning, maintenance and service and status.
- Know workplace policies and procedures**.**
- Fitt and adjust machine components and related attachments.
- Enter Processing/operating parameters required to safety and production
- Check and adjust equipment performance
- Carrying out pre-start checks with workplace information

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

Information Sheet 1- Supplying dough to the prover for production/batch requirements

1.1 Introduction

Proving is the link between the state of the dough mixes and the final baked loaf quality. the proving stage is still the heart of all processes to make raised bread understanding how aeration during mixing affects bread quality requires a knowledge therefore of how the bubbles in the dough grow and change during proving. Proving expands the original bubble structure to give a dough mass which is predominantly gas. Proving under controlled temperature and humidity in the proofer promotes yeast fermentation, which generates gas and causes the dough to rise. Proving takes from 45 to 60 minutes, depending on the product. A temperature setting of 95°F (35°C) and humidity at 85% are typical but will vary slightly, depending on the product being proofed. Bubble growth during proving is influenced by four factors:

- The rate of carbon dioxide production by yeast
- The extent to which the carbon dioxide is retained within the dough piece;
- The rate of carbon dioxide diffusion from the (saturated) liquid phase into the nitrogen nuclei
- The rate of bubble coalescence.

1.2 Supplying dough to the prover for production

Reliable and hygienic intermediate provers and conveyor systems with flexible specifications to suit a variety of applications. Dedicated provers are available to rest the dough before moulding. Alternatively, special purpose flour-free resting systems can be designed to transport the dough pieces from the upstream forming equipment while allowing the dough pieces to rest.

- **First Prover**

The First Prover accepts dough pieces from the Conical Rounder and relaxes them prior to final moulding. Removing stress from the dough ensures that it can be moulded without tearing and will prove and bake evenly. Using a First Prover enables the resting

to be carried out in a controlled, hygienic environment that preserves the rounded shape and provides a well-controlled feed to the moulders. The unit is compact, hygienic and easy to maintain from floor level.

Figure 1: first prover

https://youtu.be/m6iI9oCGqEQ (Rounder and first prover for bread production)

- **Conveyors**

For the conveying of individual dough balls without the requirement for flour dusting to avoid dough sticking. The conveyor system is designed to ensure that the dough balls cannot stick to the transportation surfaces. At each transfer point, the dough balls are rotated through 180 degrees to control the moisture migration through the dough.

Standard proving arrangements and intermediate conveyors can been replaced by a special purpose flour-free resting system that uses a variety of techniques to ensure the dough pieces are fully rested yet transfer cleanly from the divider to the moulder. The system fulfils two functions. Firstly, to transport the dough pieces from the upstream forming equipment and, secondly, to allow the dough pieces to rest.

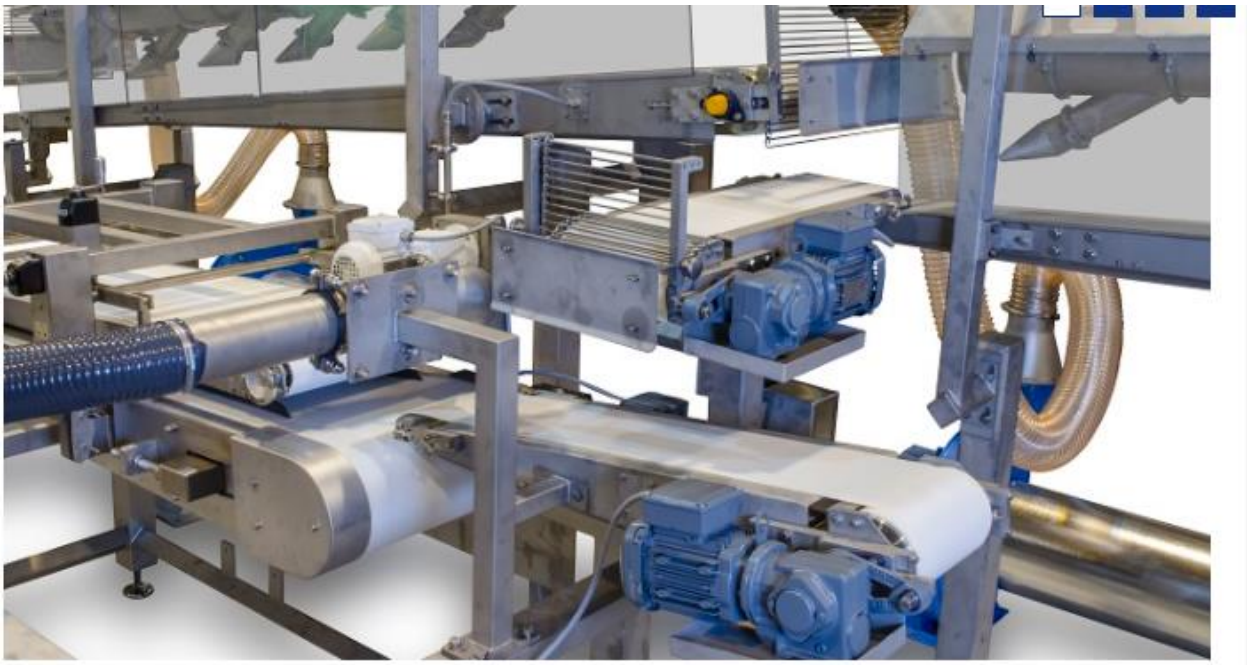

Figure 2: transferring conveyor

- **Servo controlled dough reject conveyors**

To reject double dough pieces. Mounted prior to the molder infeed conveyor, featuring photocell monitoring to determine the presence of double dough pieces. A reject chute then diverts the rejected dough ball to customer's bin. Features servo drive for variable speed control and high speed reversing.

Figure 3: Servo controlled dough reject conveyors

- **Mechanical conveyor**

Dough can be transferred from one equipment to another by using conveying units. In large-scale bakery plants, the large masses of dough produced during mixing, usually ranging from 200 Kg to several tons, are moved along the production line by conveyors. This reduces or eliminates the need for the manual labor involved in dough handling.

Figure 4: mechanical conveyor

Rounded dough pieces need time to relax before processed to flatbread or dough strands. Dimension and shape of our intermediate proofer type will be adjusted to our customer needs. It is characterized by smoothness and high availability. It generous construction allows easy maintenance and cleaning. An integrated partial air conditioning ensures ideal production conditions inside the intermediate proofer.

- Flexible proofing time
- Partial air conditioning
- Vertical or horizontal input
- Exit conveyor belt with pressure roller
- Low-maintenance components

https://youtu.be/TiSFL26VsXQ(intermidate prover)

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 point)

1. Bubble growth during proving is influenced by?
   a. The rate of carbon dioxide production by yeast
   b. The extent to which the carbon dioxide is retained within the dough piece
   c. The rate of carbon dioxide diffusion from the (saturated) liquid phase
   d. all
2. Among the following which one is not used to convey dough to the next batching steps?
   a. Belt conveyor
   b. Intermediate prover
   c. Mixer
   d. none

Test II: Short Answer Questions (3 points each)

1. Define proving process?
2. Describe the different methods dough transferring?

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

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

Information Sheet 2- Identifying and confirming Cleaning, maintenance and service and status

2.1. Cleaning and maintenance status

Before carrying out any cleaning operation, make sure that the machine's power supply has been disconnected. When removing dried dough, do not use hard or sharp implements such as metal dough cutters or other blades.To wipe the surfaces, only use a soft cloth, hot water and a gentle detergent/disinfectant. This appliance is virtually maintenance free, no lubrication is needed. If the cord or the appliance is damaged or does not operate properly, return it to service for repair. This appliance has no user serviceable parts. No repairs should be attempted by the user. Always disconnect from the socket and completely cool down before cleaning. Do not leave water in the water tray for long periods. Wait until the heating plate has cooled before emptying the tray.

It is necessary to wipe the housing and metal heating plate with a damp cloth or moistened with a mild detergent solution. In addition to this use chemical or abrasive cleaners, polishers, etc. Do not immerse the appliance in water or place it under running water. All the removable parts and accessories with care in warm soapy water if necessary or simply wipe with a soft cloth moistened with a mild detergent solution. After cleaning, wait until completely dry and cooled down before folding up the appliance for storage. The wire rack, water tray and detachable power cord can be put inside for self-storage.

2.2. Maintenance requirements

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

Food premises and equipment that are not kept in good repair and condition are a potential source of microbiological and physical contamination of food. Poorly

maintained premises and equipment cannot be cleaned effectively. Poor maintenance may allow the entry of other sources of physical, microbiological and chemical contaminants such as water, pests and dust. Poor maintenance can have health and safety implications for workers. Maintenance may include:

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

2.3. Types of maintenance

Basically there are two types of maintenance known as

- **Preventive maintenance**

Preventive maintenance (including calibration) programme must include all devices used to monitor &/or control food safety hazards & cover the maintenance procedure, frequency &identification of the person (&/or external agency) responsible activity.

- **Corrective maintenance**

Shall be carried out in such a way that production on adjoining lines or equipment is not a risk of contamination. Temporary fixes when used shall not put product safety at risk & should be removed/permanently fixed in a timely manner. Lubricants, heat transfer fluids or any other similar material used shall be of food grade where there is risk of direct or indirect contact with the product. Conduct regular inspections and maintenance of equipment's. Promptly repair or replace damaged equipment to prevent contamination, such as sieves for sieve integrity.

2.4. Equipment maintenance documentation

Equipment documents and records are an essential part of the quality system. The policies and procedures for maintenance should be defined in appropriate documents, and keeping good equipment records will allow for thorough evaluation of any problems that arise. Each major piece of equipment will have its own equipment maintenance document. Smaller, commonly used equipment such as centrifuges and pipettes may be managed with an equipment maintenance document or manual that deals with all such equipment in the laboratory. An equipment maintenance document should include: step-by-step instructions for routine maintenance, including frequency of performance, and how to keep records of performance, instructions for carrying out function checks, frequency of performance and how to record the results, directions for calibrating the instrument, guide for troubleshooting, any required manufacturer's service and repair; list of any specific items needed for use and maintenance, such as spare parts.

Maintenance and Repair request format

Name _____ Date _____

Unit # _____

Describe work needed:

_____

_____

_____

_____

_____

Please clear all items from work area. By signing below you authorize entry to your unit to complete all necessary repairs.

_____ _____

Signature of supervisor Date

Table 1: Cleaning and maintenance monitoring action

	Description	Frequency	Recommendations
Cleaning	Cleaning the Nyltex sleeves	every day	Remove any build-ups of dried dough (brush and vacuum cleaner)
	Cleaning the guards and facing panels	every week	Clean the facing panels using a soft cloth
	Washing the Nyltex sleeves	every quarter	Wash the sleeves in water (with no detergent) in a washing machine (delicates programme)
	Cleaning the carrier chain assemblies	every quarter	Clean, with a brush and vacuum cleaner, any residues present in the carrier chain assemblies
	Cleaning the motor compartment	every quarter	Clean, using a brush and vacuum cleaner, any dust present in the motor compartment
Checking	Checking the condition of the sleeves	every month	Check that the sleeves are not perforated or torn
	Checking the condition of the balance pan frames	every month	Check that they are not twisted, broken or otherwise damaged
	Checking the general operation (analyse the noise)	every month	Check that there is no rubbing, knocking or wear by listening to the noises produced
	Checking the general operation (analyse the noise)	every six months	Check that there is no rubbing, knocking or wear by listening to the noises produced
	Checking the condition of the balance pan frames	every six months	Check that they are not twisted, broken or otherwise damaged
	Checking the condition of the carrier chain assemblies	every six months	Check for any wear, rusting or other degradation
	Checking the condition of the carrier chain runways	every six months	Check for any wear or other degradation of the chain guides and plastic sprockets
	Checking the drive wheels	every six months	Check for any wear or other degradation of the drive sprockets and drive shaft bearings
	Checking the condition of the motor's drive chain	every six months	Check for any wear of the motor sprocket and drive chain

Maintaining	Re-tensioning the motor's drive chain	every six months	Re-tension the motor's drive chain
	Re-tensioning the carrier chains	every six months	Re-tension the carrier chains

2.5. Service Specifications

The heater-proofer is an aluminum transport cabinet with heaters to function as a hot food holding cabinet, and/or as a proofing cabinet. The heater, or heat drawer, is slid into place on the lower ledges of the cabinet. An electrical power cord is provided and plugged into the drawer through an access hole in the back of the cabinet. The main power switch on the front of the drawer, when switched on, will turn on the light in the switch and turn on the air circulating fan in the drawer. The circulating fan and 1500w heater element will operate continuously while the unit is on. The thermostat control knobs are mounted to the left and right of the heat/proof switch. The left thermostat knob controls the heat in the cabinet from 1 (approx. 30% relative humidity) to 9 (100% relative humidity). Average setting will to 6 (approx.85% relative humidity).

- **Service requirements**

Common services required to mixing and blending operation

- ✓ power
- ✓ steam
- ✓ fuel
- ✓ vacuum
- ✓ compressed and instrumentation air

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: Short Answer Questions (3 points each)

1. Write the cleaning and maintenance requirements of machine?
2. List the types of services required for proving operation?
3. Describe the cleaning methods of tools and equipment?

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

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

Information Sheet 3- Workplace policies and procedures

3.1 Workplace Policies and Procedures

Workplace policies often reinforce and clarify standard operating procedure in a workplace. Well written policies help employers manage staff more effectively by defining acceptable and unacceptable behavior in the workplace, and set out the implications of not complying with those policies. A policy may allow discretion in its implementation and the basis of that discretion may be stated as part of the policy.

3.2 workplace policies

Well-written workplace policies include,

- Are consistent with the values of the organisation and employment legislation
- Demonstrate that the organisation is being operated in an efficient and businesslike manner
- Ensure uniformity and consistency in decision-making and operational procedures
- Add strength to the position of staff when possible legal actions arise
- Save time when a new problem can be handled quickly and effectively through an existing policy
- Foster stability and continuity
- Maintain the direction of the organisation even during periods of change
- Provide the framework for business planning
- Assist in assessing performance and establishing accountability
- Clarify functions and responsibilities

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: Short Answer Questions (3 points each)

1. Write some of the workplace procedures?
2. Type workplace policies?

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

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

Information Sheet 4- Fitting and adjusting machine components and related attachments

4.1 Fitting and adjusting machine components

Engineering components to integrate in dough proofers design include:

- Electrical components (e.g. motors)
- Mechanical components (e.g. conveyors, gears, transmission belts, chains)
- Thermal components (e.g. source/generation of saturated steam, water atomizing systems/nozzles, steam dampers, insulation materials to minimize heat loses)
- Pan supporting systems
- Electronics and automation systems
- Instrumentation and control devices
- General construction components (e.g. equipment walls, supports, doors, racks, shelves)

Figure 5: Component of prover

- The Compact Intermediate Prover is manufactured from hygienic stainless steel and contains 88 mesh pockets which are designed to rest the dough pieces before they are moulded. Each dough piece is gently moved along the pockets inside the prover during the four minute proof time.

- Dough pieces automatically fall into the special plastic carrier pockets, which are perforated to allow air to circulate around the dough to prevent sticking. Once the proofing cycle is complete the dough is transported through an off-take chute directly into the Metro Moulder.

Component of prover

1. Control Panel
The easy to reach control panel makes operating quick and simple.

2. Plastic Pockets

The polyethylene pockets are perforated to allow air to circulate around the dough and to prevent sticking.

3. Infeed Chute
The Teflon coated chute prevents dough from sticking

Self-check 4	Written test

Name…… ID…… Date…….

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

Test I: Choose the best answer (2point)

1. Which one of the following is a component of prover?
   a. Control panel
   b. Plastic pocket
   c. Infeed chute
   d. all

Test II: Short Answer Questions (3 points each)

1. Write the engineering components of dough prover?

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

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

Information Sheet 5- Entering Processing/operating parameters required to safety and production

5.1 Introduction

The dynamics and intensity of dough proofing are influenced by the flour properties, dough composition and technological process and proofing parameters; these factors are interdependent. The fermentation process takes place only if there are optimal conditions regarding the nutrition environment and the microclimate parameters. For example, excessive proofing can produce sticky doughs with low viscosity, which are difficult to handle and also represents unnecessary cost to the bakeries. The parameters necessary for good control of the proofing process are the proofing time, temperature and relative humidity. In most industrial bread making processes the proofing time varies between 40 and 90 minutes, and the proofing parameters are: 30-35 ºC and 70-85 % relative humidity. The relative humidity varies directly with temperature and air distribution speed inside the proofing chamber. The values must be chosen so as to avoid or limit humidity losses from the loaves to the environment, which affects the product quality.

The main parameters characterizing the air in the ventilation field are: temperature, humidity, specific weight, specific heat, and enthalpy. Optimal air conditioning parameters in a bread prover are ensured using air conditioning units, which prepare the air with temperature and humidity and distribute it inside the prover, using the air vent and distribution pipes. The basic elements, which compose an air conditioning unit, are: water heat and cold exchanger, flow ventilator with the frequency variation unit, which establishes the recirculated air flow. Obtaining higher thermal efficiency in every technological area should be a priority. It is estimated that up to 50 % of industrial energy input is wasted. Usually the economic efficiency overshadows the energy efficiency when it is referred to industrial manufacturers, but the energy recovery systems are a viable solution for reducing conventional fuel usage with multiple positive effects. Currently, heat exchangers are considered to be the best systems for recovering the waste heat energy.

5.2 Processing/operating parameters of prover

- Temperature
- Amount of starter
- Time
- Relative humidity
- Amount of salt.
- Amount of sugar
- Type of sugar.
- The pH of dough.
- Presence of antimicrobial agents, including
- Spices and chlorine in water.
- Addition of yeast foods.
- Amount of yeast.
- Type of yeast.

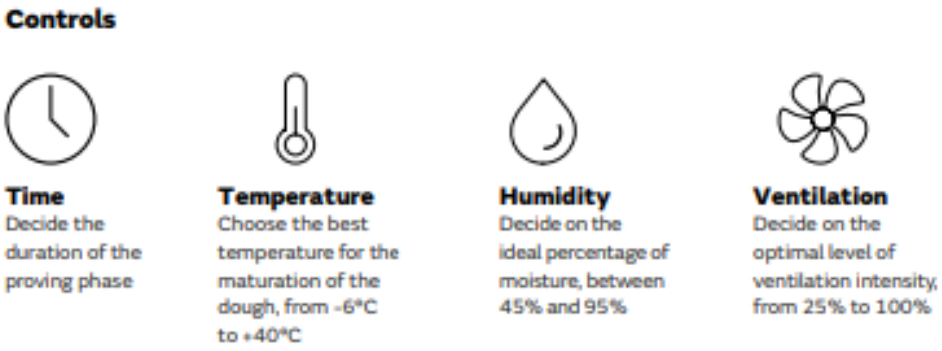

Figure 6: operating parameter of prover

5.3 Food safety and quality considerations

- Whether the conveying equipment is designed as closed or open equipment, it should as any other product-contact surface, allow for maintenance, inspection, cleaning and sanitation activities to be performed easily, adequately and quickly to reduce downtime.

- Dough conveying equipment should be properly designed, constructed and installed so as to preserve food safety in the production environment. This is important since dough pickups on conveyor surfaces could cause cross-contamination if various types of bakery products (allergenicorgluten-free) are processed in the same line (shared line).
- Dusting flour and/or oiling conveyor product-contact surfaces to manage wet and sticky doughs are possible options, but the costs of doing so should be appropriately considered. The design of the food-grade material used as band or belt should be such that minimizes dough pickup.
- If equipment units inside production line are connected through dough conveyors, e.g., mixer and divider, the design and operation of the conveying equipment should minimize transfer times and distances between equipment units. In bread and rolls production bakeries, the fully developed and fermented dough should not be allowed to stand more than 20 minutes without making it to the rounding step.

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 (2 point)

1. Which of the following is operating and process parameters?
    a. temperature
    b. pressure
    c. relative humidity
    d. ventilation
    e. all

Test II: Short Answer Questions (3 points each)

1. List the operating and processing parameters of dough prover?
2. Explain the exact temperature and relative humidity of dough prover?

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

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

Information Sheet 6- Checking and adjusting Equipment performance

6.1 Adjusting of machine component and attachments

To ensure consistent results, specialized tools are used to manipulate the speed and qualities of fermentation equipment. The dough proofer contains the following components with different functional roles.

Dough proofer is a chamber used in baking that encourages fermentation of dough by yeast through warm temperatures and controlled humidity. The warm temperatures increase the activity of the yeast, resulting in increased carbon dioxide production and a higher, faster rise. Dough is typically allowed to rise in the proofer before baking.

A dough retarder is a refrigerator used to control the fermentation of yeast when proofing dough. Lowering the temperature of the dough produces a slower, longer rise with more varied fermentation products, resulting in more complex flavors. In sourdough bread-making, cold decreases the activity of wild yeast relative to the Lactobacilli, which produce flavoring products such as lactic acid and acetic acid. Dough that is retarded before baking results in a sourer loaf. To prevent the dough from drying, air flow in the dough retarder is kept to a minimum. Home bakers may use cloth to cover dough that is kept for a longer period in the refrigerator.

A banneton is a type of basket used to provide structure for the sourdough breads during proofing. Proofing baskets are distinct from loaf pans in that the bread is normally removed from these baskets before baking. Conventionally, these baskets are made out of wicker, but many modern proofing baskets are made out of silicone or plastic. A banneton will often have a cloth liner to prevent dough from sticking to the sides of the basket, though some have no such cloth.

6.2 Types of equipment

- **Forming and cutting**

Forming and cutting a continuous dough sheet and then cutting the dough pieces to the required size and shape and printing the design on the surface of the dough pieces is a traditional and common method of forming the dough for a wide variety of biscuits. These include all semi-sweet biscuits, crackers and hard biscuits

Figure7: Forming and cutting machine

- **Rounding**

Dough pieces leaving the divider are irregular in shape, with sticky cut surfaces from which the gas can readily diffuse. Their gluten structure is somewhat disoriented and unsuitable for molding. The rounder closes these cut surfaces, giving each dough piece a smooth and dry exterior; forms a relatively thick and continuous skin around the dough piece, reorienting the gluten structure; and shapes the dough into a ball for easier handling in subsequent steps. It performs these functions by rolling the well-floured dough piece around the surface of a drum or cone, moving it upward or downward along this surface by means of a spiral track.

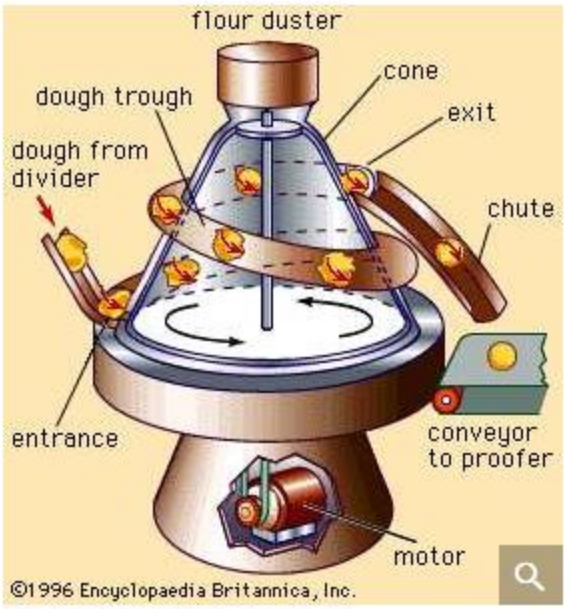

Figure 8: Dough rounder

- **conveyor**

Dough conveying is the transfer, flow, or movement of amounts of dough via conveying equipment. Dough can be transferred from one equipment to another by using conveying units. In large-scale bakery plants, the large masses of dough produced during mixing, usually ranging from 200 Kg to several tons, are moved along the production line by conveyors

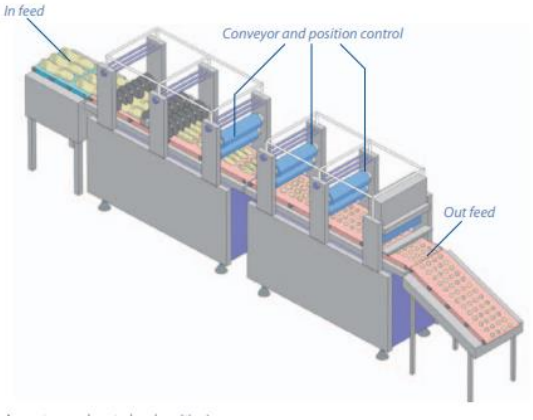

Figure9: Conveyor

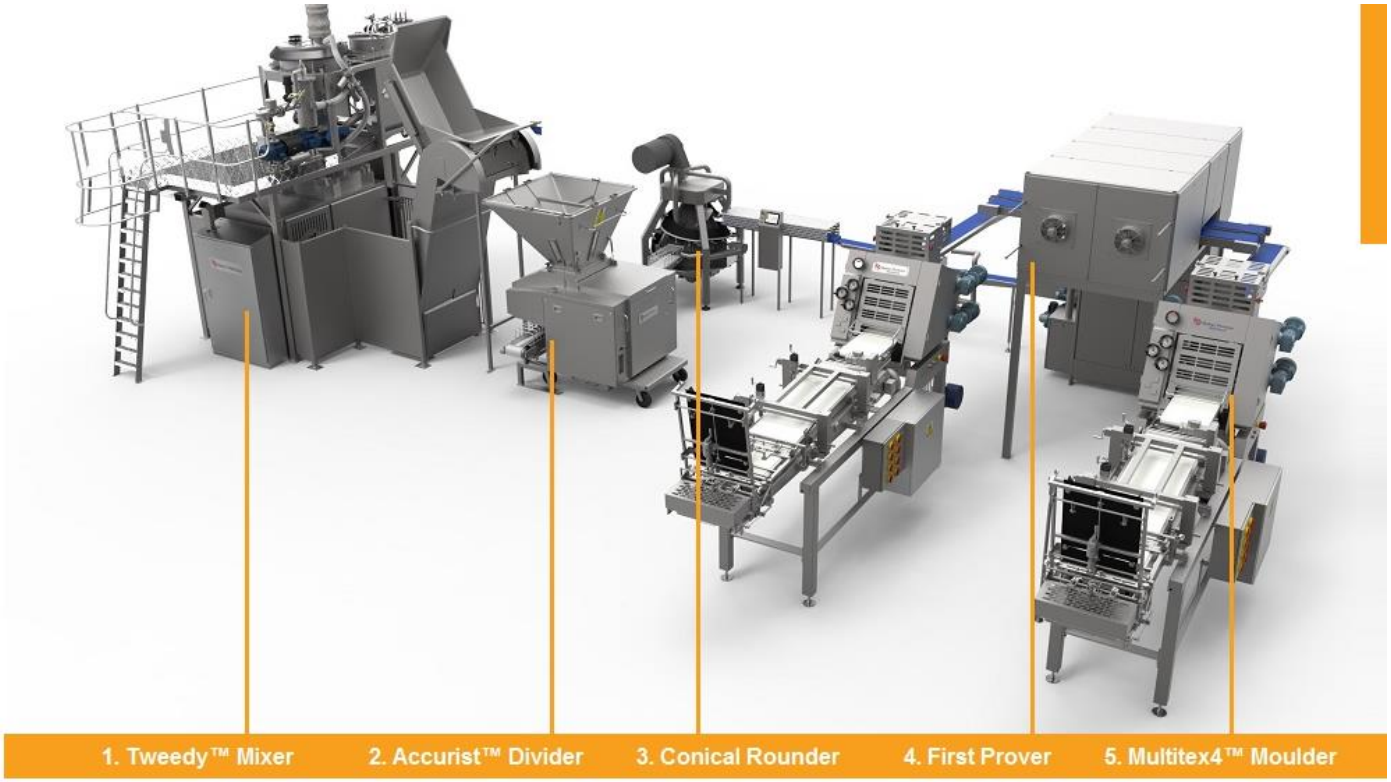

Figure 10: Bakery processing plant

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: Short Answer Questions (3 points each)

1. Write some of the bakery equipment?
2. Describe the components of dough prover?

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

Note: **Satisfactory rating 12 points**	**Unsatisfactory below 12 points**

Information Sheet 7- Carrying out pre-start checks with workplace information

7.1 Carrying out 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. Learners should be able to follow a checklist to ensure that they complete all the necessary checks. This may mean using either a pre-set format like the one shown on the focus page or the list from an operator manual. Pre start checks are pretty much exactly what they sound like, they are checks made to something most often a piece of plant, equipment or machinery prior to that thing being started or used; or checks made prior to doing something specific, like a days work or specific hazardous activity. Pre starts often involve routine inspections conducted by the machine or equipment operator. Because of this, pre starts often take the form of a pre start checklist or inspection form.

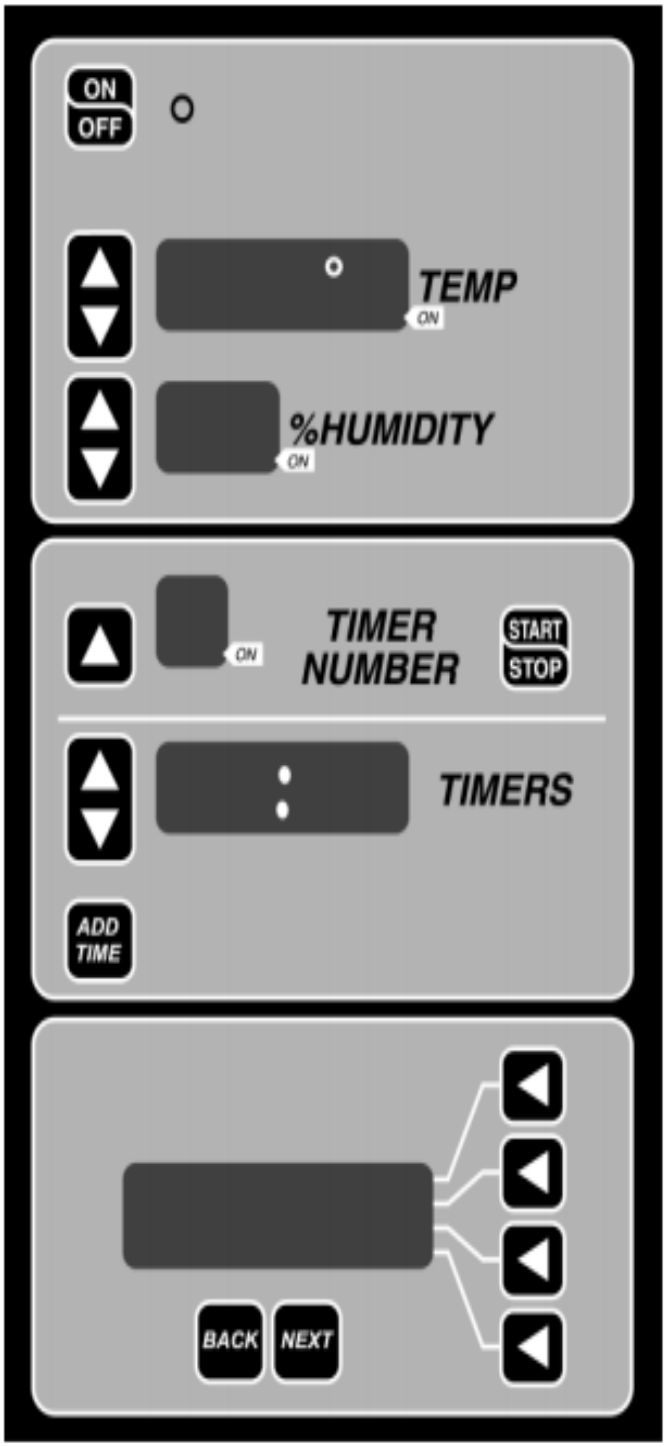

Figure 11: Pre-start checking

Start-up:

- On/off - turn on/off the setup mode.
- Temperature up or down arrow - press to set the temperature level.
- Temperature window - displays the current temperature. displays set temperature when being adjusted.
- Humidity up or down arrow - press to set the humidity level.
- Humidity window - displays the current humidity. Displays set humidity when being adjusted.
- Timer number arrow - press to select a timer (1 to 4).
- Timer start/stop button - press to start/stop the timer.
- Timers up or down arrow - press to set the desired time.
- Timers window - displays the hours and minutes remaining on the timer.
- Arrow buttons - use with LCD operation.
- LCD panel - displays all setup options of the proofer, retarder, or automatic retard/proofer operation.

Self-check 7	Written test

Name…… ID…… Date…….

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

Test II: Short Answer Questions

1. Define pre start checks? (3 point)

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

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

Operation Sheet 1- Techniques cleaning and maintenance status

1.1 wearing personal protective equipment's(PPE)

- glove
- eye google
- safety shoe
- guan
- hair net

Purpose

To prevent contamination of health supplement products by ensuring that proper cleaning procedure for equipment and accessories in the manufacturing area is clean and tidy place.

1.2 procedures of cleaning and maintenance

Step1. Dismantle all the removable parts of the equipment to be cleaned.

Step2. Adhere "To be cleaned" sticker on the equipment and transfer the removable parts to the designated washing area.

Step3. Clean the immobile part of the equipment according to the manufacturer's suggested cleaning procedure then fill-out the equipment Log Book after completion.

Step4. Reassemble all the cleaned removable parts to the cleaned equipment after assuring that every part is dried.

Step5. Affix the signed and dated "Cleaned" sticker on the reassembled cleaned equipment. The "Cleaned" sticker must identify previous batch being processed by the equipment.

Step6. Use the cleaned equipment within 72 hours from the date of cleaning. Wipe all product contact parts with clean lint-free cloth prior to next use.

Step 7. If the equipment is not used within 72 hours after the date of cleaning, adhere "To be cleaned" sticker on the equipment and perform cleaning procedure again before use.

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.

Task1. Apply wearing of personal protective equipment

Task2. Perform cleaning and maintenance operation

LG 45	LO2- Operate and monitor the proving and forming process of bread, cakes Biscuits and pastry

Instruction sheet

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

- Starting and operating the process with workplace procedures.
- Monitoring and identifying equipment variation in operating conditions.
- Identifying variation in equipment operation and reporting maintenance requirements
- Monitoring and confirming process of proved product with specifications.
- Identifying, rectifying and/or reporting out-of-specification product/process outcomes
- Maintaining the work area with housekeeping standards.
- Conducting Work with workplace environmental guidelines and legislative requirements.
- Maintaining workplace records with workplace recording requirements

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

- Start and operate the process with workplace procedures.
- Monitor and identify equipment variation in operating conditions.
- Identify variation in equipment operation and report maintenance
- requirements
- Monitor and confirm process of proved product with specifications.

- Identify, rectify and/or report out-of-specification product/process outcomes
- Maintain the work area with housekeeping standards.
- Conduct Work with workplace environmental guidelines and legislative requirements.
- Maintaining workplace records with workplace recording 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- Starting and operating the process with workplace procedures

1.1 Introduction

The proving (occasionally referred to as 'proofing') process prepares the dough for baking by subjecting it to an elevated temperature and a high level of humidity in a controlled environment. This process can take between as little as half an hour and as much as half a day. During proving, yeast in the dough fermentation produces carbon dioxide gas, thus expanding the size of the dough to roughly twice its original size. The dough temperature is typically raised from approximately 30 to 40 °C. Enzyme activity within the dough rapidly increases once the temperature reaches 35 °C, therefore it is beneficial to increase the dough temperature relatively rapidly to maximize the initial impact of the proving process.

Proving or proofing refers to the dough resting period during fermentation after moulding has been accomplished and moulded dough pieces are placed in bread pans or tins. During this resting period the fermentation of dough continues. The dough finally proofed or fermented in baking pan for desired dough height. It is generally carried out at 30-35ºC and at 85% relative humidity. Proofing takes about 55-65 minutes. During proofing the dough increases remarkably in volume. The dough expands by a factor of 3-4 during proofing. During proofing care has to be taken that the skin of dough remains wet and flexible so that it does not tear as it expands. A high humid condition is also required to minimize weight loss during proving. Temperature, humidity and time influence proofing. Proof temperature depends on the variety of factors such as flour strength, dough formulation with respect to oxidants, dough conditioners, type of shortening, degree of fermentation and type of product desired. During proofing lower humidity gives rise to dry crust in the dough. Excessive humidity leads to condensation of moisture. Dough is generally proved to a constant time or constant height.

1.2 Starting and operating the proving process

Proofing (also called proving), as the term is used by professional bakers, is the final dough-rise step before baking, and refers to a specific rest period within the more generalized process known as fermentation. Fermentation is a step in creating yeast breads and baked goods where the yeast is allowed to leaven the dough.

The process of making yeast-leavened bread involves a series of alternating work and rest periods. Work periods occur when the dough is manipulated by the baker. Some work periods are called mixing, kneading, and folding, as well as division, shaping, and panning. Work periods are typically followed by rest periods, these occur when dough is allowed to sit undisturbed. Particular rest periods include, but are not limited to, autolyze, bulk fermentation and proofing. Proofing, also sometimes called final fermentation, is the specific term for allowing dough to rise after it has been shaped and before it is baked.

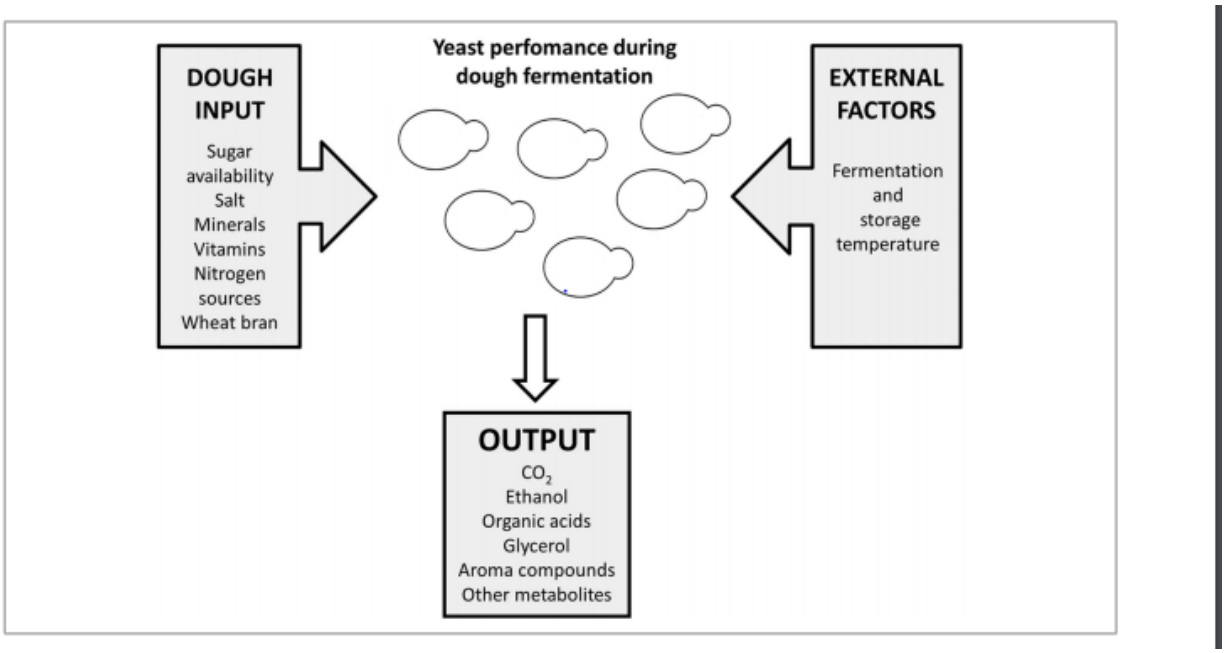

Figure12: fermentation process of dough

1.3 Functions of proving

Final proof has the following functions:

- ✓ To relax the dough from the stress received during previous operations.
- ✓ To facilitate production of gas in order to give desired volume to the dough.
- ✓ To mellow gluten to extensible character for oven rise.

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 II: Short Answer Questions (3 points each)

1. What is proving operation?
2. Describe the function of proofing?
3. Discuss the proving out puts?
4. Type fermentation inputs and external factors?

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

Note: **Satisfactory rating 12 points**	**Unsatisfactory below 12 points**

Information Sheet 2- Monitoring and identifying equipment variation in operating conditions

2.1 Equipment variation in operating conditions

Machine malfunctions must only be diagnosed and corrected by technicians who are suitably authorized or accredited (in mechanical, hydraulic or electrical work). The prover should always be positioned on a flat, level floor. This is essential for safety reasons and also to ensure that the steaming reservoir is safely and easily replenished with water. The prover should be sited so that its door(s) can be opened to its full extent. This will enable the prover to be loaded and unloaded easily. For best results ensure cleaning and operating instructions are followed meticulously. It is the customer's responsibility to install and maintain an adequate water supply.

Table 2:variations in equipment operation

Malfunction	Possible cause	Remedial action
Abnormal noise from the Dough prover	There is a foreign object in the machine	Remove the object
	A mechanical component has worked loose	Secure the component
	The carrier chains have become slack	Re-tension the chains
	The motor's drive chain has become slack	Re-tension the chain
The balance pans do not advance	There is an electrical power supply fault	Check that the power plug is live (check the fuses or connect another electrical device)
	The emergency stop button is engaged	Reset the stop button (turn and pull)
	The motor's thermal overload switch has tripped	Reset the thermal overload switch then ask a qualified technician to determine the cause of the problem
	The failsafe device protecting the motor's drive has been activated	Something has obstructed the operation of the machine. Resolve the problem then replace the failsafe device.
	The motor drive chain has broken	Replace the chain
	The drive motor has stopped working	Check the wiring and replace the motor if it is defective
	The power supply cable is damaged	Replace the damaged cable
The swing pans do not advance	The phases of the electrical supply are	Reverse 2 phases at the connector

The balance pans advance continuously	The position detector is incorrectly positioned	Adjust the detector's position
	The position detector is not working correctly	Check the wiring and change the detector if it is faulty
The balance pans do not stop at the right location	The position detector is incorrectly positioned	Adjust the detector's position
The UV lamp does not light up	The overcurrent fuse has blown	Remove anything that is blocking the air extractor, check the entire circuit then change the fuse
	The UV lamp has burnt out	Replace the lamp
The air extractor does not rotate	The overcurrent fuse has blown	Remove anything that is blocking the air extractor, check the entire circuit then change the fuse
	The extractor's motor has stopped working	Replace the air extractor

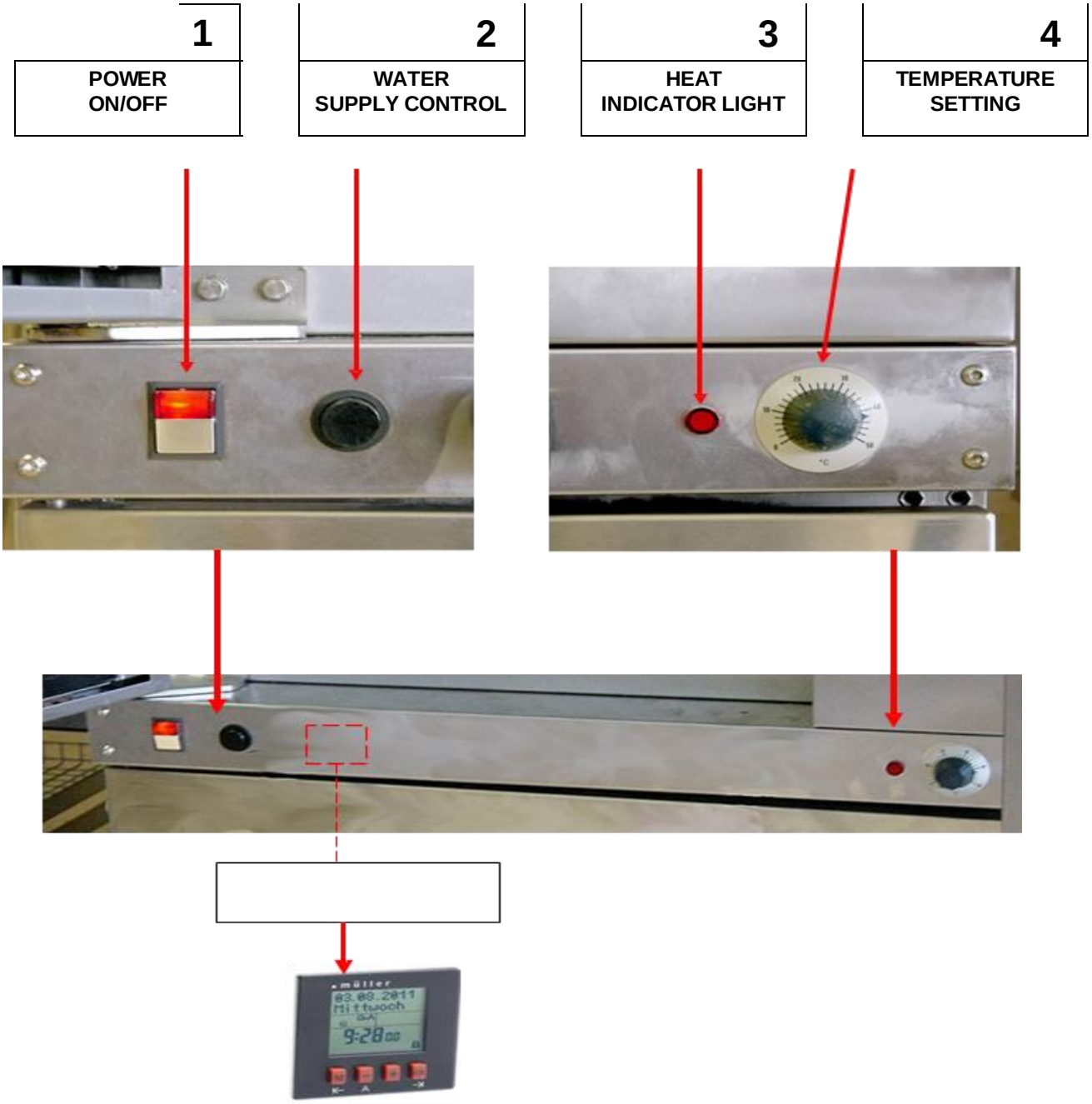

Figure 13: prover machine operating parameter

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: Short Answer Questions (3 points each)

1. Write the operating parameters of prover machine?
2. Describe the variations in equipment operation?

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

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

Information Sheet 3- Identifying variation in equipment operation and reporting maintenance requirements

3.1 Equipment operation and reporting maintenance requirements

- **Operating parameter setup**

  - Press ON/OFF button
  - Press and hold the TIMER NUMBER arrow button.

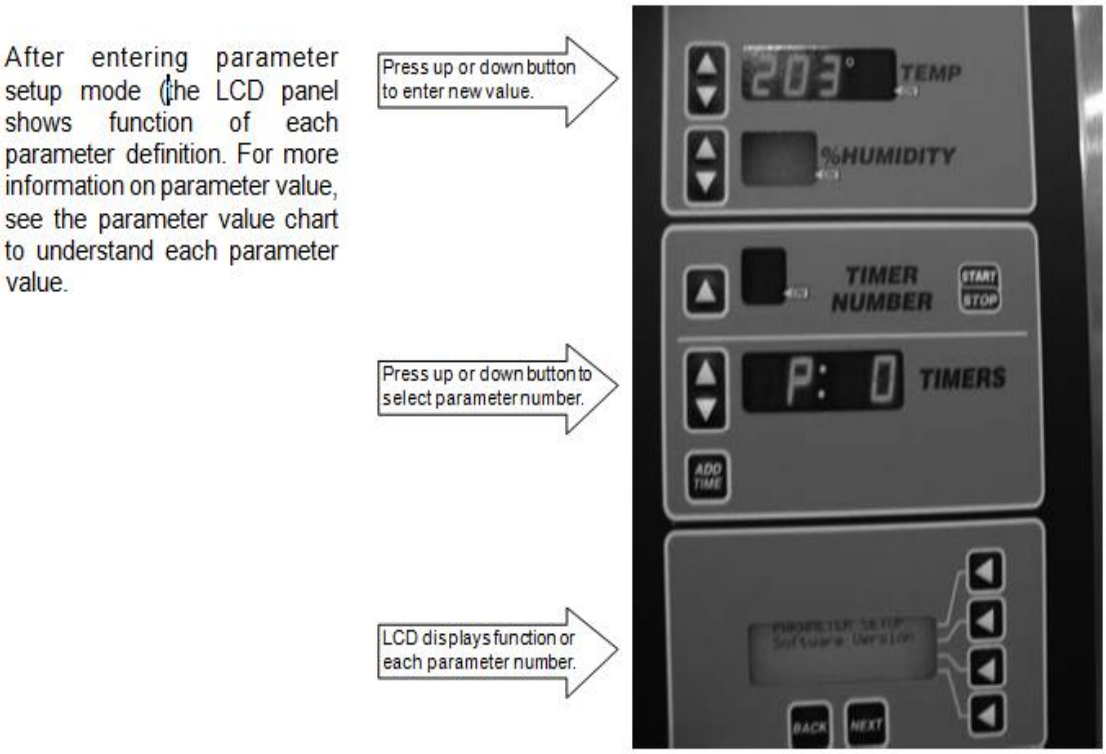

Figure 14: Operating parameters of proofer

Table 3: Equipment faults and corrective action

PROBLEM	CORRECTIVE ACTION
Machine will not turn on	1. Make sure that the power cord is plugged in. 2. Verify that the main power supply is on. 3. Contact your local authorized service office.
Machine will not heat up	1. Verify that the temperature is set properly. 2. Contact your local authorized service office.
Machine will not humidify air	1. Verify that the humidity is set properly. 2. Verify that the water supply is turned on to the equipment. 3. Contact your local authorized service office.
Machine will not cool	1. Verify that the temperature is set properly. 2. Contact your local authorized service office.

3.2 Reporting maintenance requirements format

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

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

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

Table4: Preventive maintenance schedule

S.No.	Name of Machine/ Equipment	Code/ Identification No.	Specification /Supplier	Location of place of the Machine/ Equipment	Frequency of check					Remarks
					Daily	Weekly	Monthly	Half Yearly	Yearly	

Table 5: Preventive maintenance record

S.No.	Maintenance Check Point	Frequency of check					Signature	Remarks
		Daily	Weekly	Monthly	Half Yearly	Yearly		

Self-check 3	Written test

Name…… ID…… Date…….

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

Test II: Short Answer Questions (3 points each)

1. Write some of the equipment faults and corrective actions?
2. Describe the operative conditions of machine?
3. Type the areas that may maintenance includes?

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

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

Information Sheet 4- Monitoring and confirming process of proved product with specifications.

4.1 Monitoring and confirming process of proved product

Dough volume monitoring to create a topology of the inside of the fermentation chamber, we developed a three-dimensional measuring system consisting of a linear motor, a holder with adjustable angle around the x-axis, a two-dimensional light detection and ranging (LIDAR) scanner , and a time of flight distance sensor. Time of flight distance sensor to extend the LIDAR data to the third dimension. The system needed to be as rigid as possible to obtain highly accurate measurements. We integrated the measurement system to the back of the chamber interior.

Table 6: Monitoring dough temperature

Final Dough Temperature (FDT)	Typical Bulk Fermentation Duration
75°F (24°C)	4.25 – 4.5 hours
78°F (25°C)	4 hours
80°F (26°C)	3.25 – 3.5 hours

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: Short Answer Questions (3 points each)

1. What are the monitoring time and temperature of fermentation?

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

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

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

5.1 Reporting out-of-specification product/process outcome

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

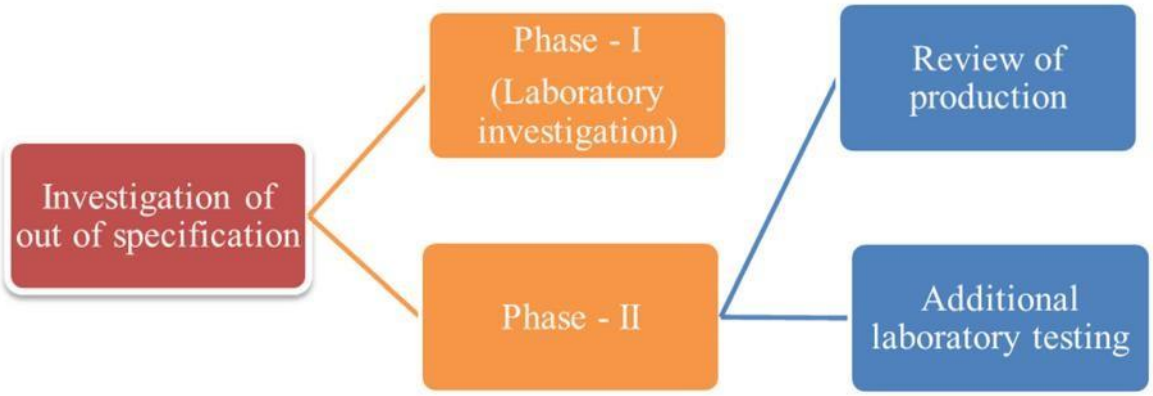

Figure 15: Investigation of OOS results

A non-conforming product can be detected through

- Customer complaints
- Internal defect findings
- Internal audits
- External audits
- Incoming material inspections
- Regular testing & inspection activities

These products should either be disposed off or reworked. On conforming that product is non-conforming, the product shall be clearly identified, kept labelled & segregated to allow traceability. All traceability records of rework shall be maintained such as product name, production date, batch no etc. Stored material for rework shall be protected from exposure to microbiological, chemical or extraneous matter contamination.

Where rework is incorporated into a product as an “in-process” step, the acceptable quantity, the process step & method of addition, including any necessary pre-processing stages, shall be defined. Where rework activities involve removing a product from filled or wrapped packages, control shall be put in place to ensure the removal & segregation of packaging materials & to avoid contamination of the product with extraneous matter. Handling of Allergen rework/ add back to be done in such a way, that the rework containing allergen shall not cross contaminate non allergen containing food material during processing, handling & storage.

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 II: Short Answer Questions (3 points each)

1. What is out of specification product?(4points)
2. How to identify out of specification products?(5points)

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

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

Information Sheet 6- Maintaining the work area with housekeeping standards.

6.1 Maintaining the work area with housekeeping standards

Good housekeeping practices in the laboratory have a number of benefits. For example, in terms of safety, it can reduce the number of chemical hazards (health, physical, reactive, etc.) in the laboratory and help control the risks from hazards that cannot be eliminated. Practices that encourage the appropriate labeling and storage of chemicals can reduce the risks of mixing of incompatible chemicals and assist with regulatory compliance. From a security standpoint, order in the laboratory makes it easier to identify items out of place or missing. And finally, good housekeeping can help reduce scientific error by, for example, reducing the chances of samples becoming confused or contaminated and keeping equipment clean and in good working order. Therefore good housekeeping practices are essential for all workplaces, example

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

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

- Tripping over loose objects on floors, stairs and platforms
- Being hit by falling objects
- Slipping on greasy, wet or dirty surfaces
- Striking against projecting, poorly stacked items or misplaced material
- Cutting, puncturing, or tearing the skin of hands or other parts of the body on projecting nails, wire or steel strapping

Self-check 6	Written test

Name…… ID…… Date…….

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

Test II: Short Answer Questions (3 points each)

2. What is housekeeping standard?
3. Describe the characteristics of good housekeeping?
4. Write the properties of poor housekeeping?

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

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

Information Sheet 7- Conducting work with workplace environmental guidelines and legislative requirements

7.1 Work place environmental guidelines

workplace hazards include things such as slippery floors, loose floor mats, and sharp knives, as well as hazardous materials. it is important for all employees to be aware of hazards, even if they seem obvious. employers should provide information and training on any safe work procedures related to the job site. safe work procedures are specific directions for doing a task or operating equipment that may pose a risk or hazard to the worker. workers should always ask their supervisor if there are any safe work procedures they need to be aware of and/or any written instructions they should be following. one of the main hazards in any workplace are cleaning products, some of which are everyday products that a person may not regard as hazardous, such as sanitizers and household cleansers. cleaning products and all other materials that are potentially hazardous are governed by the workplace hazardous materials information system.

7.2 Legislative requirements

Supplier labels When a supplier produces or imports a product for distribution and sale, that supplier must prepare a label that provides the following seven pieces of Information:

- ✓ Product identification
- ✓ Supplier identification
- ✓ Hazard symbols
- ✓ Risk phrases
- ✓ Precautionary statements
- ✓ First aid measures
- ✓ A statement advising that an MSDS is available

7.3 Work place requirements

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

• **Entry and Exit**: Entries and exits are required to be safe to allow impeded access and egress for all workers, students and visitors including those with special needs. In particular:

- ✓ entries and exits should be slip resistant under wet and dry conditions
- ✓ aisles and walkways need to be at least 600mm wide and kept free of furniture or other obstructions
- ✓ any walkways, boundaries or pathways shall be marked with 50mm wide with a contrasting colour e.g. white or yellow
- ✓ open sides of staircases should be guarded with an upper rail at 900mm or higher and a lower rail
- ✓ handrail should be provided on or at least one side of every staircase
- ✓ separate entry and exits for mobile equipment e.g. forklifts or trucks, and pedestrians are to be provided
- ✓ Power operated doors and gates should have safety features to prevent

- **Work Areas** The layout of the work area should be designed to provide sufficient clear space between furniture, fixtures and fittings so workers can move freely without strain or injury also evacuate quickly in case of an emergency. In determining how much space is required, the following should be considered:
  - ✓ the physical actions needed to perform the task
  - ✓ the need to move around while working
  - ✓ whether the task is to be performed from a sitting or standing position
  - ✓ access to workstations
  - ✓ the equipment to be handled and the personal protective equipment that may be worn.

- **Floors and Other Surfaces** Floor surfaces shall be suitable for the work area and be chosen based on the type of work being carried out at the workplace, as well as the materials used during the work process, the likelihood of spills and other contaminants, including dust and the need for cleaning. In general:
    - ✓ floors shall be free from slip or trip hazards e.g. cables, uneven edges, broken surfaces
    - ✓ floor surfaces shall have sufficient grip to prevent slipping, especially in areas that may become wet or contaminated
    - ✓ anti-fatigue matting, carpet, shock absorbent underlay, cushion backed vinyl shall be provided for workers where static standing occurs
    - ✓ carpet shall be properly laid without loose edges or ripples and should be well maintained
    - ✓ Floors should be strong enough to support loads placed on them

- **Workstations** Workstations should be designed so workers are comfortable undertaking their task and allow for a combination of sit and standing tasks. For tasks undertaken in a seated position, workers should be provided with seating that:

    - ✓ Provides good body support, especially for the lower back
    - ✓ Provides foot support, preferable with both feet flat on the floor, otherwise footrest shall be provided
    - ✓ Allows adequate space for leg clearance and freedom of movement
    - ✓ Fully adjustable to accommodate different size workers (e.g. Seat height, back rest height and back rest tilt adjustments) and should not tip or slip utilizing a five-point-base
    - ✓ Chairs shall be fitted with castors for carpeted surfaces and glides or braked castors on hard surfaces

- **Lighting** Sufficient lighting is required to allow safe movement around the workplace and to allow workers to perform their job without having to adopt awkward postures or strain their eyes to see. Emergency lighting is to be provided for the safe

evacuation of people in the event of an emergency. The following factors are to be taken into account:

- ✓ The nature of the work activity
- ✓ The nature of hazards and risk in the workplace
- ✓ The work environment
- ✓ Illumination levels, including both natural and artificial light
- ✓ The transition of natural light over the day
- ✓ Glare

• **Air Quality** Workplace are to be adequately ventilated which includes provision of fresh, clean air drawn from outside the workplace, uncontaminated from flues or other outlets and be circulated through the workplace. Workplace inside buildings may have natural ventilation, mechanical ventilation or air conditioning. An air-conditioning system should:

- ✓ Provide a comfortable environment in relation to air temperature, humidity and air movement
- ✓ Prevent the excessive accumulation of odors
- ✓ Reduce the levels of respiratory by-products, especially carbon dioxide, and other indoor contaminants that may arise from work activities

Self-check 7	Written test

Name…… ID…… Date…….

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

Test II: Short Answer Questions (3 points each)

1. Describe some the workplace requirements?
2. List the legislative requirements of work place?

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 workplace recording requirements

8.1 Maintaining workplace records

Records/reports records provide evidence that the relevant specifications and /or instructions have been complied with. Records should be made or completed at the time each action is taken. Any change to a record should be approved, signed and dated by authorized persons.

The level of documentation will vary depending on the product and stage of development. The records should enable the entire history of a batch to be traced. Additionally, the records/reports should form the basis for assessment of the suitability for certification and release of a particular batch.

As a minimum, the following should be documented:

- Receipt records for each delivery of raw materials, starting material, bulk, intermediate as well as primary packaging materials.
- The receipt records should include: - name of the material on the delivery note and the containers as well as any “in house name” and or internal code if appropriate, supplier’s name and manufacturer’s name supplier’s batch or reference number total quantity received
- Date of receipt unique receipt number assigned after receipt; and any relevant comment.

A batch processing record should be kept for each batch processed; it should contain the following information:

- Name of the product and batch number;
- Dates and times of commencement, of critical intermediate stages, and of completion of production;
- Quantities and batch number of each starting material;

- Quantities and batch number of critical raw materials;

Self-check 8	Written test

Name…… ID…… Date…….

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

Test II: Short Answer Questions (3 points each)

1. Describe the work place records?
2. Why need to recording documents?

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

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

Operation Sheet 1- Techniques starting and operating the process

1.1 wearing personal protective equipment's(PPE)

- glove
- eye google
- safety shoe
- guan
- hair net

Purpose

Preparing good quality breads with the use of basic ingredients of bread and additional optional formulas.

Equipment and Ingredients needed

- wheat flour (1 kg)
- sugar 100g
- milk powder 20g
- bread improver 3g,
- water 550 mL,
- varied yeast concentration i
- Planetary mixer.
- proofing
- salt
- oven

1.2 procedures starting and operating the process bakery product

1. Wheat flour (1 kg) + Sugar (100 g) + yeast (2.0, 2.4, and 2.8%) + Milk powder (20 g) + Bread Improver (3g) + Water (550 mL)
2. Mixing (5 min) in Planetary Mixer at 39 RPM
3. Proofing (20-30 min)
4. Addition of Salt (15 g) + Vanspati (30 g)

5. Mixing (5 min) (39 RPM)
6. Addition of Edible oil (40 g) & Mixing (39 RPM) (20min)
7. Moulding
8. Proofing (RH 80%; Temperature 400C)
9. Baking (Temperature 230°, 240°, 250°C)
10. Cooling (Room Temperature for 2 h)
11. Slicing and Packaging

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

Task1. Apply wearing of personal protective equipment

Task2. Perform procedures starting and operating the process bakery product

LG 46	LO- 3 Operate and monitor fermentation operations

Instruction sheet

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

- Starting up fermentation process
- Monitoring control points performance and maintained within specification.
- Monitoring fermentation output with specification.
- Monitoring equipment with operating condition.
- Identifying, rectifying and/or reporting out-of-specification product/process and equipment performance.
- Monitoring and confirming process product requirement using performance control chart, production

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

- Startup fermentation process
- Monitor control points performance and maintained within specification.
- Monitor fermentation output with specification.
- Monitor equipment with operating condition.
- Identify, rectify and/or report out-of-specification product/process and equipment performance.
- Monitor and confirm process product requirement using performance control chart, production

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

Information Sheet1- Starting up fermentation process

1.1 Introduction

Optimally mixed dough is subjected to fermentation for a suitable length of time to obtain light aerated porous structure of fermented product. Fermentation is achieved by yeast (Saccaromyces cerevisiae). The yeast in dough breaks down the sugars to carbon dioxide and ethanol. The gas produced during fermentation leavens the dough into foam. The foam structure of dough is discrete and has stability during fermentation. When fermented dough is baked, the foam structure gets converted into sponge structure that is responsible for aerated structure of breadcrumb. The conditions under which fermentation occurs affect the rate of carbon dioxide production and flavour development in the dough. The temperature and relative humidity conditions are particularly important for yeast activity and gas production. In the temperature range of 20 to 40ºC, the yeast fermentation rate is doubled for each 10ºC rise in temperature. Above 40ºC yeast cells are started to get killed. The yeast performs well at 30-35ºC and relative humidity of 85 % and above. The optimum pH range for yeast is 4 to 6. Below pH 4 the yeast activity begins to diminish and it is inactivated below pH 3. Osmotic pressure also affects the activity of yeast.

1.2 Starting up fermentation process

Fermentation starts as soon as you add levain to dough and ends when you divide or shape the dough. This stage is usually the longest period of fermentation, in which the majority of your dough's flavor develops, gases accumulate in the dough, and crucially the gluten structure fully develops to trap those gases effectively. In general, the majority of dough's fermentation occurs during bulk fermentation. Subsequent steps like the final rise and retarding represent a small fraction of the overall microbial fermentation and gluten development.

- **Sourdough proofing**

As a very basic time frame, the very minimum that sourdough should ferment/proof for is 4 hours. Less than 4 hours simply won't be enough time to develop enough of a gluten structure or flavor. But depending on other variables, such as:

- ✓ How much sourdough starter or leaven has been used in the dough
- ✓ The temperature of the dough and its environment

The timing for proofing sourdough can be stretched from 4 hours to even a few days. The smaller the amount of sourdough starter in the dough, and the colder the temperature, the longer the dough is able to ferment for.

General guidelines ideal temperature fermentation:

- ✓ Ideally, your dough should be proofed in a draft free and humid area that will have a consistent temperature.
- ✓ Humidity levels of 60 – 80% work best for dough proofing.
- ✓ Sourdough tends to ferment best within a temperature range of 75F – 82F (25C – 28C), as this is the temperature that yeasts work well at.
- ✓ For a more sour and developed flavor, temperature ranges that are either above 82F (28C) or below 50F (10C) are ideal, depending on which sour notes you prefer, and how long you want to ferment for.

- **Yeast proofing**

Yeast is the most commonly used leavener in bread baking and the secret to great bread making lies in its fermentation, or the metabolic action of yeast. It is the magical process that allows a dense mass of dough to become a well-risen and flavorful loaf of bread. In order for fermentation to take place, all yeast needs food, moisture and a controlled warm environment. Its byproducts from consuming food are the gas carbon dioxide, alcohol, and other organic compounds. The gas is the rising agent in bread,

and the other "waste" products create the subtle flavors and texture that make a good loaf. It is introduced into the bread's ingredients using different bread mixing methods.

1.3 Stages of fermentation

Bulk Fermentation (aka first proof, first rise, or first fermentation) happens before shaping. It's called bulk because even if you plan to make multiple loaves from the same batch of dough, everything is fermented together at this stage. Yeast does most of its work during this time, consuming sugars to produce carbon dioxide gas bubbles, which inflates gluten structure. Total bulk fermentation time is usually 1 ½ to 2 ½ hours at room temperature, and up to three hours in a colder environment.

Folding happens during bulk fermentation. It helps develop gluten structure, redistribute the yeast and sugars, and regulate dough temperature. Folding usually starts around 30 minutes into bulk fermentation. Fold dough by gently scraping the edges of the bowl and pulling the edge of the dough that's farthest away from you and towards yourself to fold the dough in half. Make a quarter turn with the bowl, then repeat folding on all four sides. Be gentle so as not to damage air bubbles or disrupt gluten structure. Wait half an hour, then fold a second time.

Shaping happens after bulk fermentation, once dough is pillowy and slightly springy. Some bread recipes break shaping down into three steps: pre-shaping, during which dough is folded on the counter top into an approximate shape; the bench rest, 15 to 40 minutes during which the dough is left to relax into its folded shape; and the final shape, during which the dough is folded again and transferred to a proofing basket, cloth-lined bowl, or other container.

Final Proofing happens once the shaped dough is in its proofing vessels. During the final proof, dough continues to rise until almost doubled in size for most bread, or even more for some other baked goods. When proofed at the proper temperature and environment, you'll see croissant dough triple in size and become light, fluffy, and jiggly. Dough can be proofed in the fridge to retard fermentation, which adds flavor and makes dough easier to handle when transferring to bread pans or other containers. Artisan bread bakers often stress the importance of cold fermentation to develop flavors.

Figure15: Final proofing appearance

1.4 Factors affecting fermentation

Temperature of the dough; optimal fermentation temperature is 78 - 82 degrees F

Temperature of the room: optimal temperature being 75 - 80 degrees F. (When the temperature exceeds 85 degrees F, off flavors result.) Dough can still rise in cooler environments, but much more slowly.

- Fermentation time; allows for the development of distinctive flavor and texture, depending on type of pre-ferment
- Amount of yeast; the more yeast the faster the fermentation. Too much can add an undesirable yeasty flavor.
- Type of yeast; instant active dry yeast contains fast acting yeast
- Amount of salt; typical Baker's Percent is 1.8 to 2.5
- Amount of sugar; small quantities (up to 5 Baker's Percent) increases yeast activity. Above 10 Baker's Percent, slows yeast activity
- Type of sugar; sucrose, glucose and fructose are fermented rapidly; maltose is fermented slowly; lactose is not fermented at all
- PH of dough; optimal pH is acidic 4 to 6. Above, fermentation slows. As yeast ferments, it produces acids to lower the pH to that range
- Presence of antimicrobial agents most spices, have antimicrobial activity, such as cinnamon and can slow fermentation. Be careful how much is added to the dough directly.

1.5 Changes occur during fermentation

Dough after optimum mixing is subjected to fermentation at around 30ºC and 85% relative humidity for a suitable length of time. Fermentation is essential for obtaining light aerated loaf of bread. During fermentation several desired physicochemical changes occur in the dough system, which is explained below.

- **Physical Changes**
  - ✓ Increase in volume due to production of CO2
  - ✓ Increase in temperature

- ✓ Increase in the number of yeast cells
- ✓ Loss of moisture
- ✓ Changes in the consistency of dough. The dough becomes soft, elastic as well as extensible.

- **Chemical changes**
  - ✓ Reduction in pH: The pH of dough is reduced from 5.5 to 4.7 due to formation of acids like acetic acid yeast activity.
  - ✓ Formation of maltose sugar by diastatic enzymes acting on starch.
  - ✓ Development of dough due to the cessation of S-S bonds and formation of new SH and SS groups, which improve the gas retention property of dough.
  - ✓ Conversion of starch into simple sugar by diastatic enzymes which is then converted into CO2 and alcohol by the following group of enzymes present by yeast:

$$\text{Starch} \xrightarrow{\text{Diastase}} \text{Maltose + Dextrin}$$

$$\text{Maltose} \xrightarrow{\text{Maltase}} \text{Dextrose}$$

$$\text{Dextrose} \xrightarrow{\text{zymase}} \text{Carbon dioxide + alcohol}$$

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: Short Answer Questions (3 each)

1. Define fermentation?
2. List the type of fermentation?
3. Write the factors that control rate fermentation?
4. Describe changes that occur during fermentation?

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

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

Information Sheet 2- Monitoring and maintaining control points within specification

2.1. Key words related to control points

Quality: It is conformance to requirements or specifications.

Quality is fitness for use.

Specification: a set of conditions and requirements of specific and limited application that provide a detailed description of the procedure, process, material, product, or service for use primarily in procurement and manufacturing.

Standard: a prescribed set of conditions and requirements, of general or broad application, established by authority or agreement, to be satisfied by a material, product, process, procedure, convention, test method; and/or the physical, functional, performance, or conformance characteristics thereof.

Quality control: It may generally be defined as a system that is used to maintain a desired level of quality in a product or service.

Quality assurance: all those planned or systematic actions necessary to provide confidence that a product or service will satisfy given needs.

2.2. Controlling fermentation process

It is important to control the fermentation so that the gas production and the gas retention coincide as closely as possible. If the peak of gas production in the dough is reached before its gas retention capacity is at a maximum, then much of the gas will be dissipated and not enough will be left to aerate the dough when its extensibility is at its highest point. On the other hand if the dough reaches its optimum gas retention capacity before gas production is at its highest rate, much of the gas will be lost subsequently. Hence, fermentation control is important to have the development of gas production and gas retention capacities at a parallel and even rate.

Strength value: Area of curve - Measured by Planimeter. More the area, strong is the dough. Relationship of area under the extensograph curve with dough strength is indicted below. Area under the curve (cm2) Dough strength 80 Weak 80-120 Medium strong 120-200 Strong >200 Extra strong

A thorough knowledge about raw material and its functions, adequate understanding of bread making procedure, control of temperature and humidity at different stages of bread making and above all personal skill and experience of baker goes a long way in avoiding faults in bread. There are a number of factors which are responsible for creating faults in bread.

Major factors which adversely influence the quality of bread are:

- Inadequate gluten in flour
- Misappropriate quantities and inferior quality of raw material
- Poor diastatic activity of flour
- Improper time and temperature of fermentation, proofing and baking
- Wrong methods of manipulation of dough i.e. knocking-back, cutting and moulding
- Inadequate cooling of bread
- Improper storage of bread and
- Lack of knowledge about the principles of hygiene.

- The controller terminations are as detailed below
    - ✓ Power Supply
    - ✓ External Alarm
    - ✓ Light
    - ✓ Humidity
    - ✓ Heating

- ✓ Refrigeration
- ✓ Oven Contact
- ✓ Defrost
- ✓ Evaporator Fans
- ✓ Humidity Sensor
- ✓ Evaporator Sensor
- ✓ Air Sensor
- ✓ Door Switch

Temperature– A range of 35–37°C (95–100°F) is recommended. Temperature and time factors work closely together.

Humidity– relative humidity (Rh) of 85–95%.If humidity is too high, moisture condensation could form on the dough, resulting in a tough crust and creation of surface blisters in the finished bread. If the humidity is too low, a dry skin will form on the dough, restricting expansion and causing crust discoloration.

Time– Proofing time should be 60–65 minutes. Over proofing results in loaves with pale crust color, coarse grain, poor texture, and a flavor with acid overtones. Under proofing yields small loaf volume, shell tops, inadequate flow, and bursting at the sides.

2.3. Control systems

Various factors like-pH, temperature, dissolved oxygen, adequate mixing, concentration of the nutrients, foam formation etc are continuously monitored to maintain optimal growth environment in the bioreactor. Very sensitive sensors are available which carry out automated monitoring of these variables. The ideal pH range for optimal growth of microorganisms is between 5.5-8.5. The pH changes due to the release of metabolites into the medium by the growing microorganisms. The required pH level is maintained by adding acid or alkali followed by thorough mixing of the medium components. The optimal temperature is maintained by using the heating and cooling systems fitted in the bioreactor. Continuous monitoring of dissolved oxygen concentration is also a must for the optimal bioreactions. The oxygen is sparingly soluble in water (0.0084g/l at 250C)

and is introduced into the bioreactor as the air bubbles. The concentration of the nutrients is also important because the limiting concentrations of nutrients help in the optimal product formation and the high nutrient concentrations have inhibitory effect on the microbial growth. Another important factor to control is the “foam formation”. The protein rich media is used in industrial fermentation which leads to ‘froth’ or ‘foam formation’ on agitation during aeration. Some antifoam chemicals lower the surface tension of the medium and cause the foam bubbles to collapse. Mineral oils with silicone or

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: Short Answer Questions (3 points each)

1. List some of the control parameters of dough fermentations?
2. What are the major quality influence factors?

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

Note: Satisfactory rating 6 points	Unsatisfactory below 6 points

Information Sheet 3- Monitoring fermentation output with specification

3.1 Fermentation output

Yeasted doughs need to undergo a final proof after shaping to regain volume and extensibility before being baked. During final proofing, acids are formed through yeast activity and contribute to flavor development. Adequate proof time is needed; otherwise, the dough pieces are unable to relax sufficiently, which can result in poor volume and a dense texture.

Final proofing time varies based on different types of doughs.

- For short mix doughs, final proofing time is short, up to 1 hour.
- For improved and intensive mix doughs, final proofing time takes between 1 and 2 hours.
- For bread leavened only by a sourdough starter, proofing times are even longer.

Proofing time and temperature are determined by flour strength, dough formulation, the degree of fermentation, treatment received by the dough during mixing, and type of product.

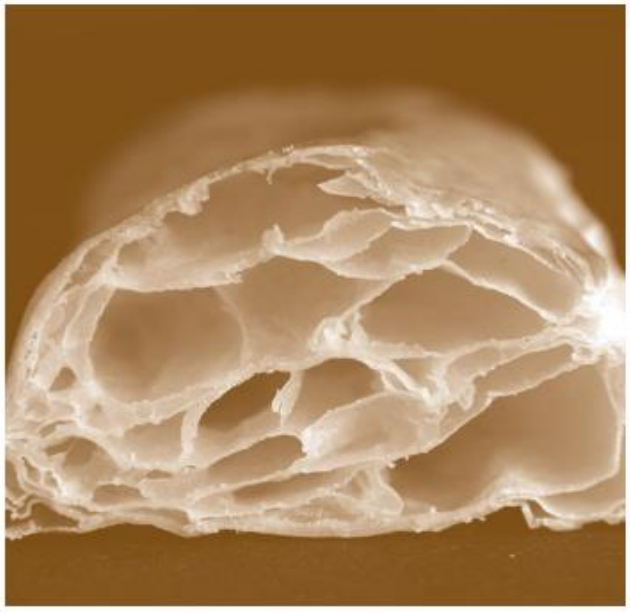

Figure16: Gas leavening

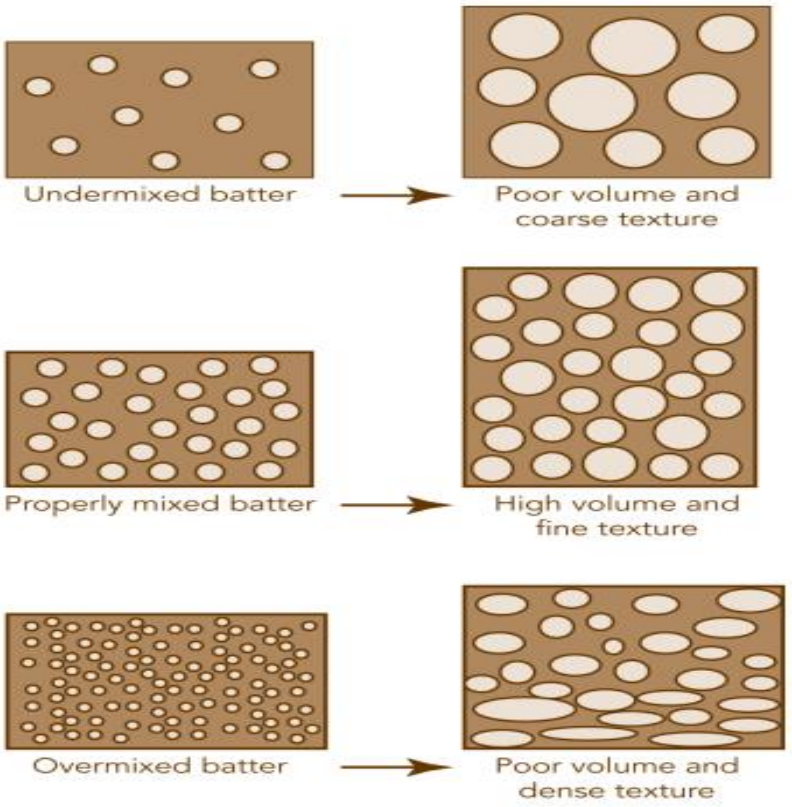

Figure 17: Air bubbles form during proving

Self-check 3	Written test

Name…… ID…… Date…….

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

Test II: Short Answer Questions (6 points each)

1. Write the characteristics of fermentation outputs?

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

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

Information Sheet 4- Monitoring equipment with operating condition

4.1 Operating parameters

The equipment operating conditions of provers will be checked for each of the parameters detailed below;

- **Chill Duration**

The time period at the start of the automatic cycle which the controller refrigerates continuously unless terminated by the 'fast chill set point'.

- **Chill Set Point**

Termination temperature during the fast chill operation if fast chill duration has not first been exceeded.

- **Storage Set Point**

The temperature at the end of the fast chill stage at which the controller holds the chamber until the recovery stage begins.

- **Recovery Duration**

The time taken for the temperature in the chamber too linearly rises from the storage temperature to the recovery temperature.

- **Recovery Set Point**

Temperature to which the chamber will linearly increase too following the storage stage.

- **Dough Retarder Prover**

Dough Retarder Prover Temperature to which the chamber will linearly increase too following the recovery stage.

- **Prove Humidity**

The relative humidity which the chamber is maintained at during the prove cycle subject to the 'Humidity Temperature Limit' parameter.

- **Prove Duration**

The time taken for the chamber temperature too increase linearly from the recovery temperature to the prove temperature.

4.2 Machine / service parameters

- Fan speed refrigeration off the fan speed during the storage stage when the refrigeration is off, listed as a percentage of full speed.
- Fan speed refrigeration on the fan speed during the storage stage when the refrigeration is on, listed as a percentage of full speed.
- Fan speed recovery the fan speed during the recovery stage, listed as a percentage of full speed.
- Fan speed proves the fan speed during the recovery stage, listed as a percentage of full speed.
- Temperature fault difference the temperature difference from correct temperature which must occur for the time set in the 'temperature fault time delay' prior to a fault being generated.
- Temperature fault time delay the time which the temperature difference set in 'Temperature Fault Difference' must occur for prior to a fault being generated.

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: Short Answer Questions (3 points each)

1. List some of the operating components of prover?
2. Describe some of the mechanical services of machine?

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 out-of-specification product/process and equipment performance

5.1 Out-of-specification product/process

Out-of-specification results analytical results indicating that the quality parameters of starting materials or product outcomes do not meet the specification are considered to be out-of-specification results (out-of-specification -results). There shall be a procedure describing the handling and investigation of such results, in which the following aspects shall be considered and covered:

In order to control of out of specification products the organization shall ensure procedures exist to investigate the cause of significant non-conformity against standards, specifications and procedures, which are critical to product quality and safety. Corrective actions taken should be undertaken in a timely manner to prevent further occurrence of non-conformity and should be accurately documented, assigning responsibility and accountability. the operator shall establish a documented procedure for dealing with products that do not comply with the intended requirements. This includes:

- Identification of product and batch code;
- Documentation
- Evaluation of the cause
- Segregation of batch or batches
- Disposal of products; and
- Internal information of relevant parties.

5.2 Common mistakes in bakery products

Be aware of two important things when you're baking bread traditionally.

- Not letting the bread dough rise long enough. Nothing is worse than a flat, dense loaf of bread unless, of course, you meant to do that! Giving the dough time to rise allows for better volume, better texture, and more developed flavors.
- Using hot water instead of medium hot water. Yeast needs to be alive and kicking in order to make your dough rise. Hot water from your tap can reach temperatures of 120°F or higher, which will kill your yeast. Instead, stick to 70-80°F for your water temperature.

- **External faults**

✓ Lack of volume: The major causes of this fault are

- ➢ a dough that is too tight and with too little yeast
- ➢ Too much salt will cause under ripening, conducive to small volume.
- ➢ Flour with low maltose will produce bread of less than normal volume. Over bleached flour or the excess use of chemical improvers, will also produce this fault.

✓ Excessive volume: will produce a bread of excessive volume dough with

- ➢ low salt content
- ➢ excess final proof
- ➢ loose moulding

Excess salt decreases the stability of gluten. An excessively slack dough also produces bread with excess volume. This can be adjusted by altering the proving time. A cool oven causes fermentation to continue in the oven. Therefore there will be too much oven spring.

- ✓ Lack of Crust Color: Baking the bread in a cool oven renders the loaf colorless. The other causes for lack of crust color may be:
  - ➢ over ripe dough, due to extended fermentation period (all the sugar is used up)
  - ➢ excess water content
  - ➢ lack of maltose
  - ➢ lack of salt
- ✓ Excess Crust Color: The likely causes are
  - ➢ insufficient fermentation
  - ➢ excessive use of sugar
  - ➢ flour might have been milled from sprouted wheat (partially)
  - ➢ baking too quickly and at too high a temperature
- ✓ Shell Tops: This is due to the formation of a crust on top of the loaf before maximum expansion has taken place. The pressure from within the loaf exerts itself in such a way that the top of the loaf lifts in the form of a lid.
- ✓ Rough Surfaces: The crust of over fermented dough is always rough. Use less yeast. Bad molding can also cause unsightly crust surfaces.
- ✓ Collapsing Bread: Collapsing bread is caused by insufficient tensile strength of the dough. Such dough is mainly due to too much water, malt or gluten improvers. Other causes could be
  - ➢ over proving
  - ➢ baking in cold oven
  - ➢ Disturbance of the dough before entering the oven.

5.3 Equipment fault indicator

- Air Sensor Fault: Caused when the controller detects a fault with the air probe. The controller will now operate by using the evaporator probe.
- Coil Sensor Fault: Caused when the controller detects a fault with the coil probe. The controller will now not carry out defrost operations and will not control the starting of the evaporator fans when cooling the chamber at the 'start' of a cycle.
- Humidity Sensor Fault: Caused when the controller detects a fault with the humidity probe. The controller will now not operate the humidity system.
- Defrost Termination Fault: Caused when the defrost termination temperature is not reached within 45 minutes.

  Door Open: Caused when the door is open for more than 30 minutes.
- Temperature Fault: Caused when the actual temperature is greater or less than the calculated temperature as specified in the service parameters 'Temperature Fault Difference' and 'Temperature
- Fault Time Delay'.
- Over Temperature
- Caused when the safety thermostat (set point 60°C) is operated by an over temperature

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: Short Answer Questions (3 points each)

1. What is out of specification products?
2. List some of out of specification products?

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

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

Information Sheet 6- Monitoring and confirming process product requirement

6.1 Introduction

Baking starts by the formation of viscous dough developed in a mixer during mixing, gluten structure is developed and starch particles are wetted. Gluten formation is the main physical –mechanical process that occurs during dough formation. As mixing progresses, air is incorporated and distributed in small fine cells. Yeast is producing CO2 during mixing and subsequent steps of bread making that is diffused in these fine cells, which are inflated by the rising of internal pressure. Biochemical processes occur also in this phase of dough formation: lipids, carbohydrates and proteins transformations, facilitated by the enzymes (from flour and yeast) presence. Various bonds formed between the gluten proteins and others components, as soluble proteins, mineral salts, starch, lipids, lead to the formation of a homogeneous and uniform mass the dough.

6.2 Monitoring and confirming process

The microbiological processes, that involve the dough microbiota, are represented by the yeast cells and lactic bacteria multiplication, followed by the alcoholic and lactic fermentation. The fermentation goal is to obtain such a dough that could optimum perform during developing, fermentation and baking phases. During fermentation the processes initiated in the mixing period are going on: the proteins molecules in gluten swell and absorb the CO2 formed by the yeast, therefore realize a network between them and conferring a spongeous structure. Under the reaction of proteolytic enzymes more malleable dough is obtained. During the fermentation, the dough had undergone a temperature incensement of 2 - 3 °C, due to the sugars decomposition by the yeast. In the same time the dough weight at the end of the fermentation is lower with 2-3%. The losses are caused by the fermentation of sugars (solid) in volatile substances (CO2 and ethyl alcohol) that partial evaporate, and by the water vaporization.

6.3 Specific parameters monitored during processing

- **Temperature**

Temperature is an important parameter that has influence on the entire technological flow, from the raw materials to the final product storage space. Every recipe has the specific temperature for each step in the process, but there are some milestones to be kept in mind and to be used for the calculation of others temperatures. The optimum temperature for the yeast multiplication is 25 - 30°C, therefore for facilitate the multiplication, the dough temperature should be between 25 and 28°C, depending on the dough type: 25°C – soft dough, 27°C – very soft dough, 23°C – dry dough. The final dough temperature depends on: ambient temperature, flour temperature, water temperature and the increasing of the temperature caused by the mixing device. On the other hand, the water temperature could be calculated depending on the final dough temperature, ambient temperature, and flour temperature and so on.

- **Duration time**

Involved for the developing of phases, operations is an important parameter too. The time for fermentation of the pre-dough is variable, depending on the consistency and temperature of the mixture; it could be very long, even 48 hours for certain types of biga. The mixing time is also different, depending on the method (direct, semi-direct and indirect), on the mixer type (spiral, fork form or hands movement imitation), on the rotation speed - but in every case it is important to set and follow the optimum time that assures a homogenous dough.

The fermentation time depends on many factors (product type, yeast quality, dough characteristics, ambient conditions, the obtaining dough method, flour Properties) and it will be decreased when:

- ✓ the yeast quantity in the recipe is high
- ✓ high temperature and humidity of the ambient zone
- ✓ dough hidratation is high
- ✓ the flour is weak

The fermentation time will be increased when:

- ✓ The flour is too strong
- ✓ Dough humidity is low
- ✓ Low temperature and humidity of the ambient zone
- ✓ The dough content is rich in sugars, fats.

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: Short Answer Questions (3 points each)

3. Write the monitoring parameters of fermentation process?
4. Describe the changes occur in the fermentation process?

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

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

Operation Sheet 1 - procedures of starting up fermentation process

Personal protective equipment's (PPE)

- glove
- eye google
- safety shoe
- guan
- hair net

1.1. Starting up fermentation process

1. Feed your sourdough starter 12 hours in advance. To a clean jaradd 10g starter + 25g water + 25g flour and let rise until doubled.
2. Mix the dough and Autolyse: Add all of the ingredients to a mixing bowl and use a stiff spatula or your hands to work the ingredients together until it forms a shaggy mass. Cover the bowl and let the doughrestfor1 hour.
3. Stretch and Fold: Perform 2-3 sets of stretch and folds.
4. Bulk Fermentation: Cover the bowl and let the dough ferment for 7-10 hours on your kitchen counter or in a65-70°F (18-21°C) area of your home.
5. Shape and Second Rise: Place the dough on a lightly floured surface. Shape the dough into a tight ball. Center the dough onto a piece of parchment paper, seam-side down. Place the dough, along with the parchment paper into a bowl and cover. Let the dough rise for 30 minutes to 1 hour.
6. Score and Bake:30 minutes before you're ready to bake, Preheat the dutch oven to450°F (232°C).Score the top of the dough and use the parchment paper as a sling to transfer the dough to the dutch oven.Coverandbakefor20 minutes, uncover and bake an additional25-30 minutes. Let bread cool completely before slicing.

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

Task 1: perform fermentation start up

LG 47	LO- 4 shut down the processes

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Identifying shutdown procedure • Cleaning and shutting down the process • Identifying and reporting maintenance requirements This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to: • Identify shutdown procedure • Clean and shut down the process • Identify and report maintenance requirements
Learning Instructions:
1. Read the specific objectives of this Learning Guide. 2. Follow the instructions described below. 3. Read the information written in the information Sheets 4. Accomplish the Self-checks 5. Perform Operation Sheets 6. Do the “LAP test

Information Sheet 1- Identifying shutdown procedure

1.1 Shutdown procedure

Lock-out procedures work safe regulations require that all powered machinery or equipment shut down for maintenance or repair must be secured against the possibility of the equipment being accidentally turned on while being worked on. To safeguard the person working on such equipment, lock-out procedures must be posted near the equipment, and the procedures listed must be followed before repairs or maintenance can start. Locking out a machine usually means the power feeding the machine is disconnected either by pulling a plug, placing a switch in the off position, or turning a circuit breaker to the off position. The disconnected circuit is then secured in the inoperative position by the use of a padlock. The person doing the maintenance or repair keeps the key to this lock until the work on the machine has been completed. The worker then removes the lock and the machine is again operable.

Depending on the situation, the lock might be used to secure the power switch of the machine or it might be used to lock shut the door to a circuit breaker panel where the thrown breaker is located. If the machine is not wired into its own power circuit but simply plugs into the wall, the lock-out procedure may require that the machine be turned off with its power switch and unplugged from the power receptacle. The plug end of the machine must be kept in plain view of the repair person so no one can inadvertently restore power without the repair person's knowledge.

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: Short Answer Questions

1. What is shut down procedure?
2. Write some of the precautions of shut down procedures?

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

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

Information Sheet 2- Cleaning and shutting down the process

Shut the equipment down prior to any inspection, maintenance or sanitation. Use the lockout/tagout procedure to ensure the equipment cannot be restarted until all work is complete.

• Never access moving equipment or product during operation. Keep fingers, hands and body parts out of the operating area at all times during operation. Do not try to pick up or realign the product or equipment during operation.

• The proofer drive chains, trays and discharge mechanism are moving with extreme force during operation. These components must not be touched, adjusted or accessed during operation except through the operator interface or via control buttons.

• Re-tension chains only when the proofer is shut down and the lockout/ tagout procedure has been implemented.

• Do not attempt to remove foreign objects from the operating area until the equipment has been stopped and the lockout/tagout procedure has been implemented.

• The starch duster and chain oil reservoirs should be fi lled prior to operating the equipment. Do not access these components during operation.

• Ensure that all guards and access doors are installed and closed securely prior to operation. Ensure that all safety devices are installed and functioning properly.

• Use an approved ladder or catwalk for accessing high components during inspection, sanitation and maintenance. Never stand on or inside the equipment. If components move or shift during shutdown, pinch points can be created which can cause severe injury or death.

• The proofer steam system must be installed by a qualifi ed contractor to ensure proper function and installation of applicable safeties. Maintain correct PSI ratings for steam components per the equipment manual.

• The steam relief valve on top of the proofer can release at any time. The steam valve must be vented to a safe area away from contact with personnel. Keep all personnel away from this steam discharge area. Do not plug or cap the drain or vent openings on the steam pressure relief valve. The steam relief valve must also be periodically tested

to verify correct function. Failure to follow these precaution swill result in death or severe personal injury

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 II: Short Answer Questions (3 points each)

1. Write some cleaning procedures?
2. What is cleaning shut down?

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

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

Information Sheet 3- Identifying and reporting maintenance requirements

3.1 Equipment maintenance requirements

- **Fans & Motors**
  - ✓ Belts should be check for tightness and wear every three months and replace as necessary.
  - ✓ Exhaust fan(s) should be cleaned annually
  - ✓ Fan bearings should be lubricated every six months with Lithium-base grease.

Note: do not overgrease as damage to bearings will result

- **Exhaust System**

The exhaust ducts, exhaust fan blades, and exhaust discharge point(s) should be inspect annually for residue build-up and clean as necessary.

- **Fire suppression system**

All fire sprinkler heads should be inspect and clean on a regular basis to prevent residue build-up, thus ensuring proper performance.

- **Controls & Heat Systems**

Electrical connections and motor load currents should be checked annually. If your booth has heated air make-up, you need to have the furnace serviced, cleaned, and re-tuned annually.

3.2 Maintenance reporting requirements

Table 3: Equipment breakdown maintenance report format

S.No.	Name / Code No. of the Machine / Equipment	Location	Nature of Breakdown	Details of repairs carried out	Breakdown Period	Work Done by	Remarks

Table 4 : preventive maintenance requirement format

S.No.	Maintenance Check Point	Frequency of check					Signature	Remarks
		Daily	Weekly	Monthly	Half Yearly	Year		

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: Short Answer Questions (3 points each)

1. Write the maintainance requirement components of machine?
2. Describe the type of actions against the maintainance

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

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

References:

https://youtu.be/m6iI9oCGqEQ

Istudor A., etc. Final bread dough fermentation – requirements, conditions, equipment. A short review, International Symposium, INMA-TEH, Bucharest, 2017, pp. 519-526.

Sinelli N. Casiraghi E. Downey G. Studies on proofing of yeasted bread dough using near- and midinfrared spectroscopy. J Agric Food Chem. Vol 56, 2008, pp. 922–931.

Burluc R. M.. Technology and quality control in bread making industry, Galati, 2007. Available at: http://www.scribd.com.

Gheorghe D. etc. Manualul de instalații, Instalații de ventilare și climatizare, (Instalations manual, Venting and conditioning instalations), Artenco Publishing House, Bucharest, 2002, p.457.

O'Rielly K., Jeswiet J.Improving industrial energy efficiency through the implementation of waste heat recovery systems, Transactions- Canadian Society for Mechanical Engineering, 2014,vol. 39, pp.125-136.

AIB International. Bread Manufacturing Process, Distance Learning Course, "Part 2 Module 01 – Dividing."**https://www.aibonline.org/Start-Your Training/Baking/Baking-Foundations/Bread-Manufacturing-Process-Online**, 2018.

The trainers who developed the learning guide

No	Name	Qualification	Educational background	Region	College	Mob.No	E-mail
1	Shiferaw Negassa (Phd)	Phd	Plant science (BSc), horticulture (MSc), agronomy and crop physiology(Phd)	Oromia	FTVET Holeta satellite college	0911913680	nesgeashiferaw@yahoo.com
2	Tesfaye Mekuriyaw	B	Food science and technology	Addis Ababa	Kolfe industrial college	0927785174	Tesfayemekuriyaw48@gmail.com
3	Moti Taye	A	Plant science	Oromia	Bako College	0921801540	tayemoti12@gmail.com
4	Adamu Bekena	B	Food technology and process engineering	Addis Ababa	Yeka industrial college	0988620906	adamuberkana2@gmail.com
5	Fitsum				FTA facilitator		

AKNOWLEDGEMENT

We wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development Teaching, Training and Learning Materials (TTLM)

We would like also to express our appreciation to the TVET instructors and respective industry experts of Regional TVET Bureau, TVET College/ Institutes, Bishoftu Management institute, BEAR II UNESCO project and Federal Technical and Vocational Education and Training Agency (FTVET) who made contributions for the development of this curriculum with required standards and quality possible. This Teaching, Training and Learning Materials (TTLM) was developed on October 2020 at Bishoftu, bishoftu management institute.