Fruit and Vegetable Processing

Level III

Based on May 2019, Version 2 OS and March. 2021, V1 Curriculum

Module Title: - Operating Pumping Equipment

LG Code: IND FVP3 M10 LO (1-3) LG (31-34)

TTLM Code: IND FVP3 TTLM 0321v1

March 2021E.C

Bishoftu,Ethiopia

United Nations Educational, Scientific and Cultural Organization

With the support of Republic of Korea Funds-in Trust

Table of content

LG #31	LO #1 Prepare pumps for operation

Instruction sheet

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

- Confirming equipment, tools, materials and services
- Checking and Calibrating Equipment and tools

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

- Confirm equipment, tools, materials and services
- Check and Calibrate equipment and tools

Learning Instructions:

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

Information Sheet 1- Confirming equipment, tools, materials and services

1.1. Equipment and materials

The key difference between equipment and materials is that materials form the actual product and are the parts, components, ingredients and raw materials that become a part of the product whereas equipment refers to the tools, machinery, devices that help create the product.

1.2 Tools, materials and services include:-

- Pumps like positive displacement pumps
  - ✓ Positive displacement pumps is a reciprocating compressor or gear type pump is an example of a positive displacement machine. It increases pressure by squeezing or pushing the fluid into a region of greater pressure.

- kinetic pumps
  - ✓ **Kinetic pumps**, also known as fluid-dynamic pumps or turbopumps, are machines in which energy is transmitted to the fluid continuously through an impeller, which imparts kinetic energy (velocity) to the fluid, which energy is then transformed into pressure in an immediately subsequent phase, thus reducing velocity.

Fig 2 kinetic pumps

- Jack lifts and trolleys
  - ✓ A jack is a mechanical lifting device used to apply great forces or lift heavy loads
  - ✓ A trolley jack is a mobile device that enables you to lift your vehicle to carry out work

Fig 3 Jack lifts and trolleys

- Wrenches and screw drivers
  - ✓ screwdrivers are the fruit of Beta's long expertise in screwdriver design and close cooperation with the mechanics of motor racing teams.

Fig 4 Wrenches and screw drivers

- Pipes, seals, valves, bearings, impeller, etc.
  - ✓ Impeller is a rotating component equipped with vanes or blades used in turbomachinery (e. g. centrifugal pumps).
  - ✓ Bearings in centrifugal pumps support hydraulic loads imposed on the impeller, the mass of the impeller and shaft, for the impeller and shaft seal.
  - ✓ bearings are subjected to adverse forces that can potentially reduce their service life and reliability.
  - ✓ Centrifugal pump bearings are typically subjected to high axial loads, marginal lubrication and high operating temperatures and vibration—all while attempting to minimize friction. Friction, if uncontrolled, can result in power loss, excessive heat generation, increased noise and/or wear, and premature bearing failure.
  - ✓ Single-row angular contact ball bearings single-row angular contact ball bearings are used in moderate-speed centrifugal pumps in which high thrust loads can be anticipated.

Fig 5 Bearings

- Centrifugal pumps that handle water or nonhazardous liquids do not use a mechanical seal. They use a cheaper and simpler packed seal. The objective in starting a centrifugal pump is to minimize the dam-age to the pump's mechanical seal during start-up.

CENTRIFUGAL PUMPS

Self-Check – 1	Written test

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

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Gear type pump is an example of a positive displacement machine.?(3pts)

2. Centrifugal pumps handle water or nonhazardous liquids do not use a mechanical seal?(3pts)

Test I: Short Answer Questions

1. Write at least five equipments which is use for pump opiration ?(4pts)

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

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

Information Sheet 2- Checking and calibrating equipment and tools

2.1 Calibration

Is a documented comparison of the measurement device to be calibrated against a traceable reference standard/device. The goal of calibration is to minimise any measurement uncertainty by ensuring the accuracy of test equipment.

2.1.1 Equipment Calibration or Verification

A calibration or verification procedure is prepared by the testing laboratory for all critical laboratory equipment where laboratory personnel perform the testing. If the procedure is described in an operators manual or a test procedure, this can be referenced on a separate procedure. Calibration or verification records are maintained. Minimum calibration or verification schedules according to AOAC International for the most common types of laboratory equipment are important. For analytical equipment not listed, the laboratory must develop a comparable schedule. Generally, laboratory equipment is categorized as follows:

- General service equipment such as blenders, ovens, hotplates, furnaces, stirrers;
- Volumetric equipment such as class a glassware, mechanical and automatic pipettes and burets; Note: A manufacturer's certificate of graduation accuracy Class A glassware may be accepted. Other volumetric equipment, including for mechanical and automatic pipettes and burets, are calibrated by the laboratory's procedure.
- Measuring instruments such as balances, chromatographs, spectrometers, thermometers; and Physical standards such as reference weights and reference standards

- **Calibiration positive displacement**

Calibration Procedure of positive displacement pump

Calculate the capacity of the pump at the speed and stroke rate at which the test will be run.Fill the calibration cylinder with the product that the pump is feeding.Record the starting level of the calibration cylinder.Run the pump for the desired amount of time, generally 0.5 - 1.0 minute.

Fig 1 positive displacement pump of fruit and vegetable processing

Self-Check – 2	Written test

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

Test II: Write true if the statement is correct and false if the statement is incorrect

1. calibration is a documented comparison of the measurement device to be calibrated against a traceable reference standard/device. (3pts)

Test I: Short Answer Questions

1. Write the importance of calibration?(4pts)

2. Write at least thre types of calibration?(3points)

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

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

Operation Sheet 1- Checking and calibrating equipment and tools

Objectives: After the end of this course to know the student how to calibirate the equipment and which equipment and tools used for calibiration of fruit and vegetable processing equipment

Materials:-
Buffer solusion, PH mater , termometrer

Procedure.

Step 1. Apply safety rules.

Step 2. Calculate the capacity of the pump at the speed and stroke rate at which the test will be run

Step 3. Fill the calibration cylinder with the product that the pump is feeding.

Step 4. Record the starting level of the calibration cylinder.

Step 5. Run the pump for the desired amount of time, generally 0.5 - 1.0 minute.

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

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

Task-1 Checking and calibrating equipment and tools

LG #32	LO#2 Operate Pumping Equipment

Instruction sheet

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

- Starting up pumps
- Monitoring and maintaining pump performance
- Identifying, rectifying and reporting equipment performance

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 up pumps
- Monitor and maintain pump performance
- Identify, rectify and report equipment performance

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 up pumps

1.1 Starting up pumps

pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action, typically converted from electrical energy into hydraulic energy. Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid.

1.2 startup the operations role

Its all about boosting team productivity to ensure a product idea becomes a reality as quickly as possible. Basically, an operations manager makes sure everyone is doing what they should be doing, and holds the startup.

Before the pump is start know flow and pressure to expect on the instrumentation . use all of your senses when starting pumps or any equipment bearing temperatures (or the oil temperature) should be closely monitored on startup.for start a water pump engine rotate the fuel valve lever to on position (to the right). Push the air choke lever to the close position out to close the choke(to the left). Hold the frame by the left hand. Grasp the recoil starter handle and fast pull it until the engine starts.

Fig 1 Starting up positive displacement pumps

1.3. Centrifugal pump start up procedure

- Open the suction valve.
- Open any recirculation or cooling lines.
- Fully close or partially open the discharge valve, depending on system conditions.
- Start the driver.
- Slowly open the discharge valve until the pump reaches the desired flow.

http://youtube.com/watch?v=zTzwBl4lHMM

- Before you start the pump
  - ✓ Make sure the power is turned off.
  - ✓ Gain access to the pump system.
  - ✓ Check for damage.
  - ✓ Test a hose.
  - ✓ Open the relief valves.
  - ✓ Attach the hose.
  - ✓ Turn on the water and wait for it to enter the tank.
  - ✓ Turn the power on.

Self-Check – 1	Written test

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

Test I: Short Answer Questions

1. List centrifugal pump start up procedure?(4pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

2. pump is a device that moves fluids (liquids. (3pts)

3. startup the operations role is all about boosting team productivity to ensure a product idea becomes a reality as quickly as possible.(3pts)

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

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

Information Sheet 2- Monitoring and maintaining pump performance

2.1 Monitoring pump performance

Is to measure the temperature rise of the liquid through the pump. pump performance characteristics is assumed, as how to measure test data in a repeatable manner. For condition monitoring, repeatability is more important than absolute accuracy. Pump monitoring methods should be chosen that can detect each of the pump degradation modes that are either experienced or expected. Common monitoring pump performance methods include the following:

- Electrical plant tests: relevant for motor condition
- Visual inspection and non-destructive testing: particularly relevant for pump casing wear
- Performance monitoring and analysis: relevant for pump internal conditions
- Sampling and analysis of lubricants for deterioration and wear debris: relevant for bearings and lubrication system faults
- Vibration monitoring and analysis: probably the most widely applied method of condition monitoring for rotating machines in general, and suited to detect such faults as unbalance, misalignment, looseness

Centrifugal pumps must be monitored regularly, correctly and accurately according to a specific plan which is made by a specially trained personnel.

❖ The following six parameters should be regularly monitored to understand how a pump is performing:

1. Suction pressure (Ps)
2. Discharge pressure (Pd)
3. Flow (Q)
4. Pump speed (N)
5. Pump efficiency (η)
6. Power.

To improve pump performance: avoid oversizing the pump,Impeller trimming,Variable frequency drives,parallel pumping systems,limit pipework pressure loss,eliminate unnecessary use,carry out maintenance.

2.2 Pump Maintenance Schedule

- Clean bearing bracket from any oil if found.
- Check oil drain plug.
- Lubricate the bearings.
- Inspect suction and discharge flanges for any leak.
- Inspect pump casing for any unusual damage signs.
- Inspect the seal.
- If the pump is offline check the coupling and its shims for any damage.

Table.1 Maintenance schedule for pumping equipments and tools

Date	Tool	Maintenance check points	Signature	Maintenance required	Signature
03/20/2013	Fruit and vegetable pump	Centerfidual pump		Posetive displacement pump	
Maintenance Performed				Date	**Signature**
pumping equipments and tools					

Table.2 Maintenance check list of fruit and vegetable pumping equipments and tools

	pumping equipments and tools of Fruit and vegetable	Yes	No	Remark
1	Are tools in safe condition?			
2	Are instruction manuals available?			
3	Are power tools properly grounded?			
4	Are guards and shields in place?			
5	Is Personal Protective Equipment available?			

6	Are pumping equipments and tools properly stored?			

Self-Check – 2	**Written test**

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

Test I: Short Answer Questions

2. Write the methods common monitoring pump performance?(4pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

4. Monitoring is to measure the temperature rise of the liquid through the pump (3pts)

5. condition monitoring, repeatability is more important than absolute accuracy. (3pts)

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

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

Information Sheet 3- Identifying,rectifying and reporting equipment performance

3.1 Identifying and rectifying pumping equipment performance

The performance of a pump equipment can be measured using three main analytical models; flow rate (Q), head (h), and efficiency (n). These three models allow users to gain an overall sense of how the pump is performing during operation. Pump efficiency is determined by principally two parameters, head and flow rate, in addition to other factors such as properties of the fluid, impeller design and motor speed selected.

3.1.1 pumping equipment performance Characteristics

The output of a pump running at a given speed is the flow rate delivered by it and the head developed. Thus, a plot of head and flow rate at a given speed forms the fundamental performance characteristic of a pump.

3.2 Reporting pump equipment performance

The main purpose of regular maintenance is to ensure that all equipment required for production is operating at 100% efficiency at all times. To solve the problems of flow rate (Q), head (h), and efficiency (n) of pumping eqipment sharing the experience, discussing the problem and solution with other members of the operations and quality control staffs through one-on-one discussions, group discussions, written communications, or formal training sessions so that each team member gains the experience of defect recognition, solution determination, implementation for as many situations as possible. Untrained pump operators can result in abused machinery and costly breakdowns.To improve the problems of pump performance avoid oversizing the pump Impeller, Variable frequency drives, Parallel pumping systems,Limit pipework pressure loss,Eliminate unnecessary use,Carry out maintenance

Self-Check – 3	Written test

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

Test I: Short Answer Questions

1. List three main analytical models of performance of a pump can be measured?(5pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. The output of a pump running at a given speed is the flow rate delivered by it and the head developed (5pts)

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

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

Operation Sheet 1- Staret up pumps

Objectives: To know how to start/opirate pumping equipment opiration

Materials: Voltemeter, testlight, wrenches and screw drivers, motors

Procedure:-

Step 1: Apply safety rules.

Step 2: Prepare pump operating(checking) equipment

Step 3: Open the suction valve and cooling lines.

Step 4: Fully close or partially open the discharge valve, depending on system conditions. E.g. pressure condition, temprature condition

Step 5: Start and Slowly open the discharge valve until the pump reaches the desired flow.

Step 6. Check the pressure gauge to ensure that the pump quickly reaches the correct discharge pressure.

Step 7. Staret up pumps

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

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

Task-1 Start up pumps

LG #33	LO#3 Shutdown and Maintain Pumping Equipment

Instruction sheet

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

- Shutting-down Pumping equipment
- Dismantling Pumps for cleaning or cleaning in place
- parts and components in motors and pumps
- Taking corrective action
- Recording workplace information 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:

- Shut-down Pumping equipment
- Dismantl Pumps for cleaning or cleaning in place
- Replace parts and components in motors and pumps
- Take corrective action
- Record 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- Shutting-down Pump equipment

1.1 Shutting down Pumping equipment

its a process of factory pumping equipment; a termination/suspension of pumping equipment operation, services is turn off or stop. Shutdown includes steps to render the systems safe, such as removal of hazardous process materials and inert (asphyxiating) gases. The systems might be cleaned as part of the shutdown; Plant shutdown, or turn around, is a temporary closure of a building to perform maintenance.

Fig 1 Shutting-down Pumping equipment

- shutdowns should have two objectives:
  - ✓ To repair problems identified during previous major shutdowns, and
  - ✓ To inspect parts of the plant not accessible during operation in order to identify problems that will be repaired during future planned shutdowns

- Shut down procedures
  - ✓ Prepare checking equipment and testing materials
  - ✓ cleaning (in some cases cleaning may be carried out by a dedicated cleaning crew)
  - ✓ Follow steps that are stated in the work place
  - ✓ Shutdown the machine from simple to complex
  - ✓ Installing safety/security lock-off devices and signage

- The agenda items for pumping equipment production coordination meeting include:
  1. Safety first
  2. Lock out Tag out procedures
  3. Standard operating procedures
  4. What systems are to be secured and by whom
  5. How systems will be secured and by whom
  6. Why will the systems be isolated or shut down
  7. Who are the contact persons on the job site in case something

Self-Check 1	Written Test

Name…… ID…… Date…….

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

Test I: Say true/false

1. Shutting-down is a process of factory Pumping equipment; a termination/suspension of pumping equipment operation, services is turn off or stop. (5point)

Test III: Short answer

1. Write the two objectives shutdowns should (5point)

_____

_____

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

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

Information Sheet 2- Dismantling Pumps for cleaning or cleaning in place

2.1 Cleaning in place/CIP

can be described as the cleaning of equipment and vessels at the same place without movement of them to a different place. The cleaning agents can be transferred to the vessel or equipment types either thorough fixed piping or flexible hoses.

Fig 1 Cleaning in placefruit pumping equipment

2.1.1 The CIP process can consist of the following elements:

- Supply pump
- Return pump
- Heat exchanger with Black/Plant steam supply
- Chemical tanks i.e Acid, Alkali tanks
- Supply Pressure gauge or transmitter
- Supply temperature sensors
- Conductivity meter with sensor

2.1.2 Factors affecting the effectiveness of the cleaning agents:-

- Temperature of the cleaning solution. Elevating the temperature of a
- cleaning solution increases its dirt removal efficiency.
- Molecules with high kinetic energy dislodge dirt faster than the slow moving molecules of a cold solution.
- Concentration of the cleaning agent. A concentrated cleaning solution will

- clean a dirty surface much better than a dilute one due to the increased surface binding capacity.
- Contact time of the cleaning solution. The longer the detergent contact period, the higher the cleaning efficiency.
- After some time, the detergent eventually dissolves the hard stains/soil from the dirty surface.

2.2 Cleaning Out of Place/COP:

is defined as a method of cleaning equipment items by removing them from their operational area and taking them to a designated cleaning station for cleaning. It requires dismantling an apparatus, washing it in a central washing area using an automated system, and checking it at reassembly.

Fig 2 Cleaning Out of Place of fruit pumping equipment

Self-Check 2	Written Test

Name…… ID…… Date…….

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

Test I: Say true/false

1. Cleaning in place can be described as the cleaning of equipment and vessels at the same place without movement of them to a different place. (3point)

Test II: Choose the best

1. Which one of the following elements consist CIP process (3points?)

A. Chemical tanks i.e Acid, Alkali tanks B. Supply Pressure gauge or transmitter

C. Supply temperature sensors D. All

Test III: Short answer

1. Write the factors affecting the effectiveness of the cleaning agents (4point)

_____

_____

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

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

Information Sheet 3 - Replacing parts and components in motors and pumps

3.1 Parts and Components in motors and pumps

Pump: is a mechanical device that converts mechanical torque into hydraulic energy. It simply facilitates movement of fluids from one place to another using suction or pressure or both.

Motors, on the other hand, are electro-mechanical devices that are used to convert electrical energy into mechanical energy. When a pump breaks down, sometimes buying replacement parts or components is an alternative to buying a new pump. Most centrifugal pumps consist of a few basic components:

Housing/casing – The outer shell of the pump which protects most of the components from the outside elements. The casing of the pump should be of materials suitable to withstand the environmental conditions of the application (e.g. submersible pumps should be water and rust corrosion resistant

Impeller – A rotating disk with a set of vanes coupled to a shaft. When the impeller rotates, it imparts energy to the fluid to induce flow. Flow characteristics of the pump vary widely based on the impeller design.

Motor – The power source of the pump which drives the shaft. AC motors and DC motors are the most common power sources for pumps, but internal combustion engines (ICEs), hydraulic power, and steam power are other possibilities.

Shaft – The shaft connects the impeller to the motor/engine that provides power for the pump.

Volute – The inner casing that contains the impeller and collects, discharges, and (sometimes) recirculates the fluid being pumped. The materials used to construct the lining of the pump volute must be compatible with the handled media.

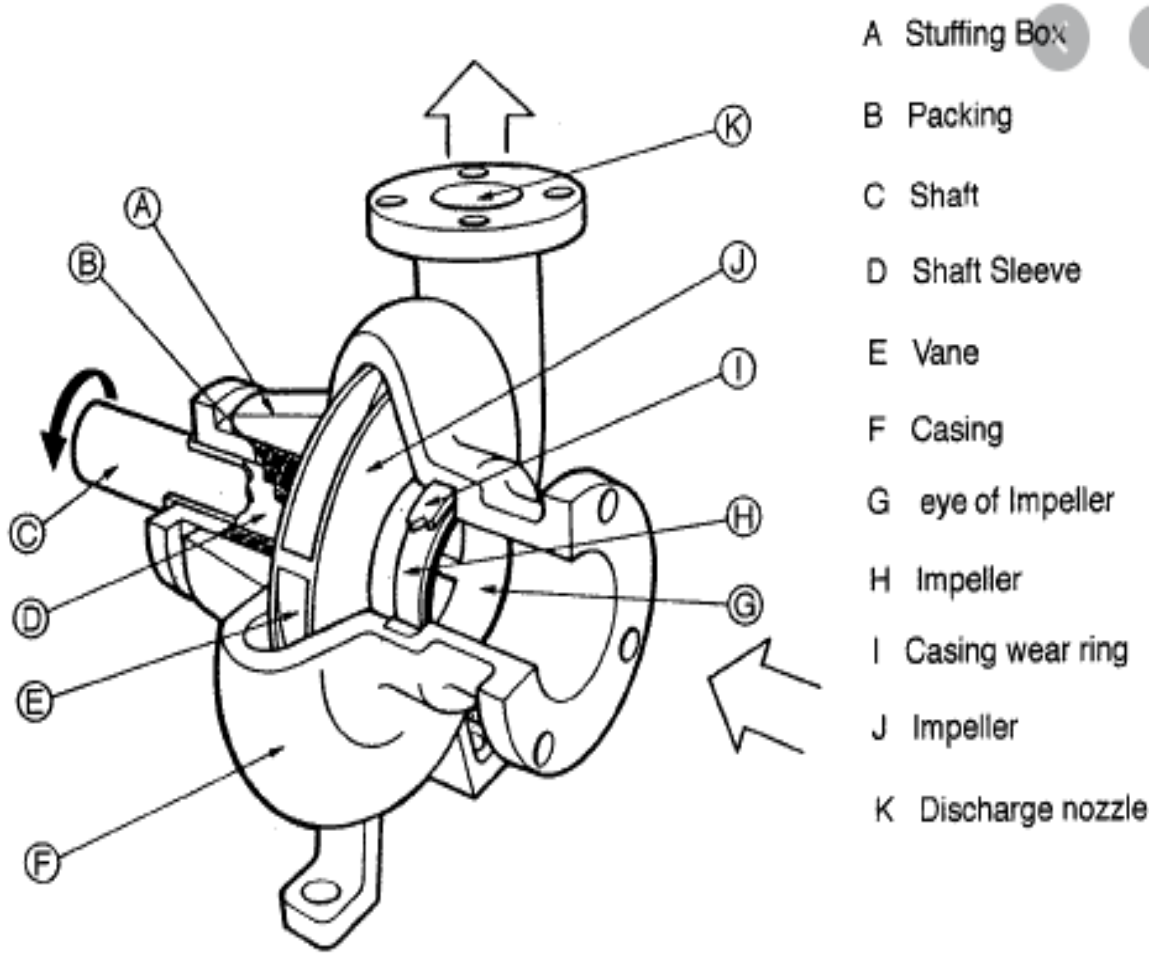

Fig 1 Parts and components of centerfigual pumps of fruit processing

Fig 2 Componants and parts of DC motors

Self-Check 3	Written Test

Name…… ID…… Date…….

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

Test I: Say true/false

1. Pump is a mechanical device that converts mechanical torque into hydraulic energy (3point).
2. Impeller – is rotating disk with a set of vanes coupled to a shaft. (3point).

Test II: Short answer

1. Write the few basic components of centrifugal pumps (4point).

_____

_____

_____

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

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

Information Sheet 4 - Taking corrective action

4.1 The corrective actions

Corrective actions is the actions taken by the licensee to prevent the pump equipments from CCF/ Common-cause-failure event from re-occurring. The defence mechanism selection is based on an assessment of the root cause and/or coupling factor between the impairments. Corrective actions is the action take after events.

Corrective action include:

- Rotating and moving pumping eqipment process materials, solids, fluids and gases under pressure or flowing
- Temporary connections or by-passes electrical, hydraulic or pneumatic energy sources
- Out-of-specification operation.
- Tightening/Replacement of loose/worn out belts
- Tightening of nuts and bolts
- To keep my nuts and bolts tight
    - ✓ Thread a self-locking nut on the bolt and tighten with the appropriate wrenches.
    - ✓ Slip a split, or lock, washer over the bolt end. Twist the nut on and tighten it down with the appropriate wrenches.
    - ✓ Paint thread-locker compound all the way around the bolt threads as far down as possible.

- Alignment of pump and motor

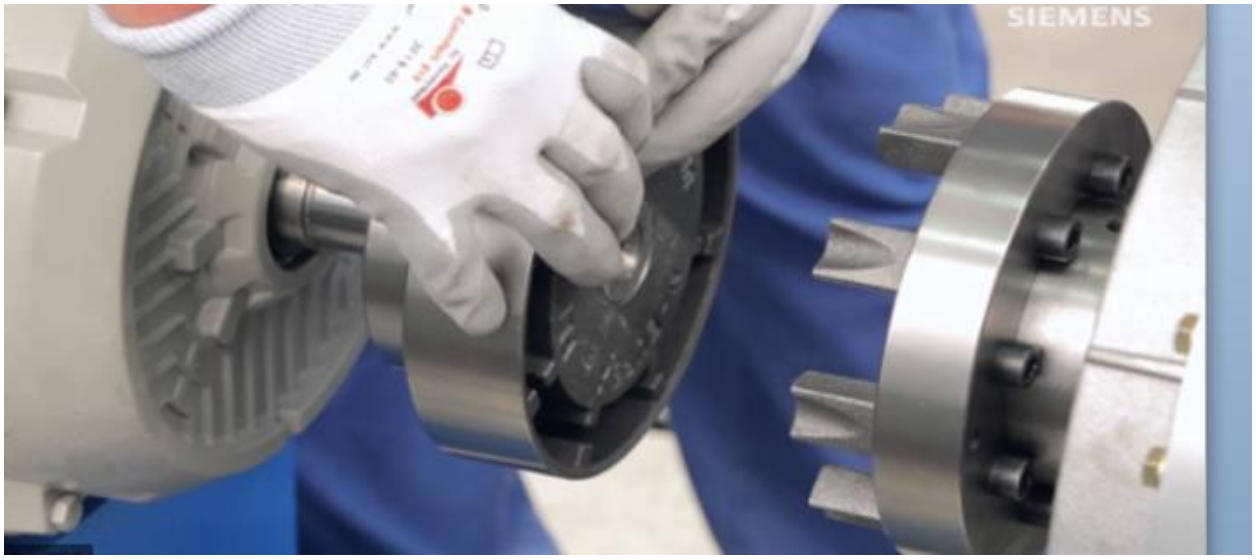

Fig 1 Alignment of fruit processing pump

Root causes that can cause pump or motor failure

- Design Flaw:
  - ✓ design flaw is a design that fails to meet requirements or to serve customer needs. A flawed design can result in unstable and unusable products, services and environments.
- Inadequate Procedures
  - result of insufficient pressure at the suction end of the pump or Net Positive Suction Head Available (NPSHa) causing the liquid .
- Incorrect Tools
  - ✓ Incorrect tool will also increase the amount of effort required to get a job done wrong with causing damage to either the equipment or the surface being worked on.
  - Insufficient Repair Time
  - ✓ Insufficient repair time is not engaup time to mentain pump equipment that cause pump or motor failure.

Self-Check 4	Written Test

Name…… ID…… Date…….

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

Test I: Say true/false

1. Corrective actions is the actions taken by the licensee to prevent the CCF/ Common-cause-failure event from re-occurring (5point)

Test II: Short answer

1. Write the cause of pump or motor failure (5point)

_____

_____

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

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

Information Sheet 5 - Recording workplace information

5.1 Workplace records

A record is information created,receive,and maintained as evidence and information by an organization or person, in pursuance of legal obligations ISO 15489- The International Records Manegemant Standards. Workplace records management concerns more of the day-to-day activities involving physical or digital files, like capturing, storing, modifying, or sharing them**.**

Workplace information include:-

- Standard operating procedures (SOPs)

  Standard operating procedure (**SOP**) is a set of step-by-step instructions compiled by an organization to help workers carry out routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations.

  The purpose of a SOP is to provide detailed instructions on how to carry out a task so that any team member can carry out the task correctly every time.The purpose or objective of a SOP should restate and expand a well-written title.

Fig 1 Recording workplace information

- Manufacturers' specifications
- Production schedules
- Batch/recipe instructions

Records management has several goals:

- Organizing existing and future documents
- Improving workflow
- Allowing quick search and retrieval of documents
- Maintaining organization of files to reduce the number of lost and misfiled documents
- standard forms and reports

Analysis of these records can identify:-

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

Methods of work place record use notecards or a notebook to record the information.

- Print out the information you find and then
- Take notes on notecards or in a notebook.
- Find it easier to remember information if you have written it down yourself.
- Document each source as you work
- Specifications.

Many industries require thorough documentation performed in a specific way. If organizations fail to maintain organized records, some of the consequences may include:

- ✓ Ongoing audits
- ✓ Improper billing
- ✓ Inefficiencies for employee growth
- ✓ Lost revenue
- ✓ Compromised safety
- ✓ production schedules and instructions
- ✓ manufacturers' advice

Self-Check – 5	Written test

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

Test I: Short Answer Questions

1. Write the methods of work place record ?(5pts)

Test II:write true if the statement is correct and false if the statement is incorrect

1. Standard operating procedure (SOP) is a set of step-by-step instructions compiled by an organization to help workers carry out routine operations. (5pts)

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

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

Operation Sheet 1- Shutdown pumping equipment

Objectives: To know shutdown pumping equipment opiration

Materials: Voltemeter, testlight**,** Wrenches and screw drivers

Procedures

Step 1: Apply safety / wearing over,over shoes, eay glass, musk,hear cover

Step 2: Prepare pump checking equipment and testing materials fruit processing

Step 3: Cleaning (in some cases cleaning may be carried out by a dedicated cleaning crew) shutdown pumping equipment lines/parts

Step 4: Follow steps that are stated in the work place

Step 5: Shutdown the pumping equipment from simple pump breaker line to complex pump breaker lines

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

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

Task-1 Shutdown pumping equipmen

References

H. W. King and E. F. Brater, Handbook of Hydraulics, 5th Edition (McGraw-Hill, 1963).2. I. J. Kerassik and R. Carter, Centrifugal Pumps (McGraw-Hill, 1962).3. M. Bale, Pumps and Pumping (Crosby & Son, London, 1889).4. H. P. Bloch, An Introduction to Pump Reliability (Van Nostrand, 1990).5. H. P. Bloch, “Consider a Low-Maintenance Pump,” Chem. Eng., July 1988.

Brewer/ ISPE & Quality Executive Partners, R. (2020, September 21). Cleaning Validation: Day 1 - Regulations, Definitions, Cleaning Processes [PDF].International Society of Pharmaceutical Engineering. https://www.dropbox.com/s/iu5c31em6c2juze/ISPE%20Cleaning%20Validation.pdf?dl=0

Lydersen, B. K., D'Elia, N. A., & Nelson, K. L. (1994). Cleaning of Process Equipment: Design and Practice. In Bioprocess engineering: Systems, equipment and facilities. Wiley-Interscience.

Chisti, Y., Moo-Young, M. Clean-in-place systems for industrial bioreactors: Design, validation and operation. Journal of Industrial Microbiology 13, 201–207 (1994).

Geigert, J., Klinke, R., Carter, K., & Vahratian, A. (1994). Role of quality control in validation of biopharmaceutical processes: Case example of clean-in-place (CIP) procedure for a bioreactor. PDA journal of pharmaceutical science and technology, 48(5), 236-240.

lo	Name	Qualification	Educational background	Region	Cell phone	E-mail
	Teshale Besufikad	B	Food science and post-Harvest Technology	Sidama/Hawass I.college	0916312644	teshu44@gmail.com
	Urmale gedino	B	Food Process Engineering	A.A/Colfe I.college	0986961645	
	Tagese mamo	B	Food science and post-Harvest Technology	Sidama/ A. Wendo.I.college	0953340936	
	Bogale Tesfaye	A	Food security	A.A/Yeka I.C.college	0900016274	Bogalti19@gmail.com
	Getaneh gene	B	Plant science	Amhara	0918133568	geche21gene@gmail.com
	Biruktawit muluneh	B	Chemical engineering	Debub/Dilla I.college	0932442375	
	Mamit emuhay	B	Food technology and process engineering	A.A/Yeka I.C.college	0935663548	mamitemuhay@gmaie.com
	Belete Bekel	B	Food Process Engineering	Sidama/ Sidama/ A. Wendo.I.college	0915647559	
	Kiros Mezgebu	A	Food science and post-Harvest Technology	A.A/Ethiopian technical university	0921310111	kirosmez@gmail.com
0	Muluken kasahun			Federal TVEAT	0910779269	Muluk.last@gmail.com