COFFEE AND TEA PROCESSING

Level-II

Based on May 2019, Version 2 Occupational standards

Module Title: -Conducting Routine Maintenance

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Table content

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LG #18	LO #1-Conduct routine inspection of plant and equipment

Instruction sheet

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

- Inspecting equipment
- Assessing service maintenance

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:

- Inspecting equipment
- Assessing service maintenance

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” Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If your performance is satisfactory proceed to the next learning guide,

Information Sheet 1- Inspecting Equipment

1.1 Introduction

Maintenance is defined as working on something to keep it in a functioning and safe state and preserving it from failure or decline.

Some of the standards and procedures should be taken into account when creating coffee machine inspection procedures include:

Coffee Machine Safety Standards

- UL 197 Commercial Electric Coffee Machine Standard
- UL 1082 Household Electric Coffee Machine Standard
- UL 60730-2-9 Temperature Sensing Control Standard
- IEC 60335-2-15 Household Electric Coffee Machine Standard

Coffee Machine Food Protection and Sanitation Standards

- NSF/ANSI 4-2009: Household Electric Coffee Machine Food Protection and Sanitation Standard

Coffee Machine Performance Standards

- The International Electro technical Commission IEC 60661 standard is used to evaluate the performance of the different brands and models of coffee machine. Some of the tests included in this standard are designed to establish coffee quality, energy consumption, coffee temperature and coffee output time of the tested coffee machine.
- The Association for Home Appliance Manufacturers and the American National Standards Institute formulated ANSI/AHAM CM-1-2007 to provide a guideline in comparing and evaluating the performance of the different brands and models of household coffee machine

1.2 Inspections of equipment

Inspections of equipment includes: Informally or as part of a structured program associated with proactive maintenance

Inspect or checking coffee and tea processing machine daily/weekly/monthly/yearly. Example of inspection equipments include:

- regularly check machine components
- It will keep this debris from entering the pulsator, which can cause major problems
- Be sure claw and liner vents are unplugged,

As clogged claw vents can increase vacuum pressure and impact cows' overall health.

One of the most important inspections is to check the liners on the pulsator to make sure they are operating properly. If the liners fail, you can end up with faulty milking, which can quickly add up in a larger dairy and cause health problems for a dairy herd.

Professionals who inspect dairy equipment regularly find that pulsator malfunctions are present in more than half of all service calls, and many of these could have been detected with a quick finger test

1.3 Inspection schedules

Coffee and tea processing and manufacture requires machines and installations by the use of which the raw material is transformed into a product. Each and every piece of equipment of which the plant is assembled must perform its duty. Achieving the exact performance of the plant requires maximizing the efficiency of all equipment.

Any equipment is subjected to wear and tear and its efficiency and performancebased on:

- inspection of performance based on log book entries

- scheduled inspection combined with scheduled servicing at selected points considered crucial for plant efficiency
- Scheduled inspection of all other sections of the plant aiming at detection of faults not detectable by other routine procedures.

The practice of plant performance inspection and servicing of machines should be carried out with sufficient simplicity and thoroughness to yield the best results. The creation of a routine system in this respect is the first step in establishing good habits of proper care of all items of equipment.

Fig1. Coffee roasting machine inspection.

Purpose of inspection of equipment: it is to identify whether work equipment can be operated, adjusted and maintained safely with any deterioration detected and remedied before it results in a health and safety risk. Not all work equipment needs formal inspection to ensure safety and, in many cases, a quick visual check before use will be sufficient. However, inspection is necessary for any equipment where significant risks to health and safety may arise from incorrect installation, reinstallation, deterioration or any other circumstances. The need for inspection and inspection frequencies should be determined through risk assessment.

Developing a Checklist for Inspection of Coffee Processing Facility

Name of processing establishment:

Address of processing establishment:
Average annual production:
Name and qualification of manager:
No. of workers:

OK	Surroundings	Needs Attention /comments
☐	Is the area around the establishment clear of	☐
☐	Rubbish, weeds, brush? Is there standing water on the grounds?	☐
	Other outside Plant conditions to be looked into: ----------	

Condition of equipment

☐	• Is all equipment that comes into contact	☐
	With coffee cleaned as often as necessary to	
	Prevent contamination of product?	
☐	Is equipment design suitable (construction	☐
	Material, areas of product build-up)?	
☐	Is there any evidence of seepage of cleaning	☐
	solvents or lubricants that could contaminate coffee?	
☐	Is the equipment hard to disassemble for clean up?	☐

☐ equipment cleaning and maintenance issues that should be covered:

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 (2 points each)

1. Which one of the following are Coffee Machine Safety Standards?

A. UL 1082 Household Electric Coffee Machine Standard
B. UL 60730-2-9 Temperature Sensing Control Standard
C. IEC 60335-2-15 Household Electric Coffee Machine Standard
D. all

2. Which one of the following are Purpose of inspection of equipment?

A. Operated and adjusted B. maintained safely C. detect deterioration and remedied before use D. all

Test II: Short Answer Questions

1. Explain Maintenance? (5 points)
2. Define Inspections of equipment? (6 point)

Note: Satisfactory rating 10 points Unsatisfactory - below 8 points

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

Information Sheet 2- Assessing service maintenance

2.1Introduction

All maintenance operations included in the plant should fulfill the following three Assessment is assessing the performance of the equipment that required:

- applicability,
- efficiency and
- profitability.

An operation is applicable if it can be implemented; it is efficient if it significantly reduces failure rate and it is profitable if it improves production

Full Service maintenance

Full service offer is a complete maintenance solution for demanding customers, who value their time and money. Our engineers will do their best to accommodate your work pattern to minimize the time without your money maker.

Full service maintenance includes:

- assessing every part of your machine,
- complete de-scaling with industrial grade products,
- deep cleaning,
- calibrating,
- Replacing obsolete elements and lubricating them.

Assess of service maintenance

Regular professional service and preventative maintenance is the best way to keep your machine in a good shape. At EspressoClinic we will strip your machine down and check the condition of every single element. All worn out parts, like seals and gaskets, will be replaced and freshly lubricated to avoid problems in the future. In addition, your machine will be double descaled with a high-performance descaling solution, deeply

cleaned and you will receive a piece of advice how to treat it to extend its lifespan. **Maintenance Assessment Process (MAP)** is an evaluation of the current state of the maintenance function of a corporation, company, or facility. The purpose of the assessment is to gauge how capable the maintenance function is in supporting the goal of operational excellence.

During coffee and process we use service like power, water, steam, gas and compressed and instrumentation air

2.2 **Maintenance features**

Maintenance required.

1. Operational checks to simulate automatic start-up, shut-down and emergency shutdown.
2. Inspection and maintenance

2**.3 Maintenance requirement determination depend on maintenance policy for technical equipment**

- **Functional analysis**. This form of analysis is based on the definition of system operational requirements and the system or equipment maintenance concept and is used as the basis of detailed design. MRD requires the results of functional analysis in order to identify failure modes, causes and effects, and associated criticality using failure modes, effect and criticality analysis.

- **Maintenance determination**. Once the failure modes and the effect of failure have been determined, they are used as inputs for determining the corrective and preventative maintenance requirements.

- **Maintenance task analysis (MTA)**. After identifying the corrective and preventative maintenance requirements, the logistics resources necessary to support these requirements must be identified through the process of MTA. MTA will identify resources; for example:

- Repairable and breakdown spares.
- Trade skills and training.
- Packaging handling and transport.
- Procedures required performing the task.
- Facilities.
- Support and test equipment.

Fig -2. Routine maintenance task for tea rolling machine.

There are many variables capable of influencing your tea rolling process. Of course, product temperature at the time of processing has a significant impact, but there's also the product's storage temperature, the length of time the product was stored, the quality of the tea itself, and the product's air exposure prior to reaching the roller.

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

1) Define maintenance assessment process? (5 points)
2) What are three categoriesof Maintenance requirements? (5 point)
3) Write at least two Maintenance requirement determination? (5 points)
4) Define Full service maintenance and mention some service maintenance(5 points)

Note: Satisfactory rating 15 points Unsatisfactory - below 10 point

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

LG #19	LO #2- Prepare to conduct routine maintenance

Instruction sheet

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

- Assessing maintenance tasks
- Preparing equipment for maintenance
- Selecting hand tools
- Checking and reporting unsafe and faulty tools / items
- Planning and scheduling maintenance for affected work area

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:

- Assess maintenance tasks
- Prepare equipment for maintenance
- Select hand tools
- Check and report unsafe and faulty tools / items
- Plan and schedule maintenance for affected work area

Learning Instructions:

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1.1 Maintenance task.

Maintenance tasks indicate which action or set of actions a maintenance technician is supposed to perform to complete a work order.

Types of maintenance tasks

Different maintenance tasks are assigned based on the type of equipment that needs maintained. For instance, an asset that's not critical to operations might be assigned a discard task while an asset that's critical to operations might be assigned a restoration task.

An inspection or failure finding task may be assigned in an environment that embraces a proactive maintenance approach. For these tasks, technicians run through a maintenance checklist and need to look for subtleties in the equipment's operational state. After this, they determine if a follow-up task (i.e. work order) is needed.

Failure finding task: failure finding tasks, used in reliability-centered maintenance, reveal hidden failures or potential failures.

Inspection: As a key component of a maintenance program, inspections include tasks that check the condition of equipment and determine what tools, materials, and labor are required to service them. Many inspections must be conducted while a production line is running or equipment is operating. Inspections cannot interrupt manufacturing or production processes, and many pieces of machinery cannot be checked adequately without seeing them in action.

Scheduled discard task: a scheduled discard task involves replacing a specific part or component of a piece of equipment at regular time intervals, regardless of its performance quality.

Scheduled restoration task: A scheduled restoration task is a complete overhaul of machinery or equipment that is performed on a predetermined schedule regardless of

the condition of the equipment. They are designed to bring piece of equipment or machinery back to its original operating condition.

Routine maintenance tasks:

- Lubricating, cleaning, or adjusting machinery.
- Inspecting equipment to ensure proper operation and safety.
- Replacing parts that show deterioration.
- Checking, testing, and maintaining safety equipment, such as safety barriers, fire extinguishers, or alarm systems.
- Checking for and replacing damaged signage or utilities, like light bulbs
- General workplace maintenance, such as cleaning floors, replacing HVAC filters, and washing windows, trash removal, and landscaping.

1.3 MAINTENANCE ASSESSMENT PROCESS

The Maintenance Assessment Process (MAP) is an evaluation of the current state of the maintenance function of a corporation, company, or facility. The purpose of the assessment is to gauge how capable the maintenance function is in supporting the goal of operational excellence.

Maintenance and repair coffee color sorter machine

Maintenance and Repair

1. Before your maintenance please use the air guns to clean channel and sorting boxes, test ejector. When use the air gun to clean the sorting box, do not make the air gun blow toward the direction of the nozzle.
2. During woring please inspect the signal indication (including work instructions, alarm indication) and the ejector action case ;
3. Inspect air compressor, air pressure, oil temperature, and the sound whether is abnormal, every working date please drain off water of compressor at least three times ;

4. After shut down machine 15 minutes, power off the power switch and air compressor switch, drain off water of air compressor;
5. Use the air gun to clean the ejector, channel and sediment in the sorting box;
6. Use the air gun to clean the inside of the machine, vibrator, hopper and Ash scraping device.

Weekly: Check the filter;Check the cleanliness of wiper brush;Every six months:Replace the compressor oil once.

Replacement of wearing parts

1. Wipe brush replacement Dial up the stopper plate at the bot side of the wipe bursh, pinch the adjust rack to rotate(deviate from the direction the glass), then you can remove the wipe brush down.

2. Maintenance of wipe cylinderUnscrew the screws on the beam path of the rear fuselage, which is used for installing the cylinder, then you can remove the wipe cylinder for maintenance.

3. Replace the air filter

(A) Unscrew the four screws on the filter.

(B) Open the filter cover, you can remove the filter for cleaning or replacement.

Fig-3. Coffee color sorter machine maintenance

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

1) Define Maintenance tasks? (5 points)
2) ---------- is one of the principal causes of equipment breakdown. (5 points)
3) Write at least two replace the air filter? (5 points)
4) ---------is an evaluation of the current state of the maintenance function of a corporation, company, or facility.(5 points)

Note: Satisfactory rating - 15 points Unsatisfactory - below 10 points

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

Information Sheet 2- Preparing equipment for maintenance

Proper maintenance is critical to personnel safety, smooth equipment operation and lasting performance.

Purpose of maintenance:

- maintenance to help promote equipment safety,
- provide an optimum end product and
- to prevent costly down time.

Maintenance activity, a technician makes sure:-

- To prevent breakdowns. When machine failure
- To a predetermined schedule...

2.1 Maintenance of basic equipment

- Picking (harvesting machine),
- Coffee color sorter
- Coffee grinder
- Coffee roaster
- Tea roller
- Tea pluckier
- Tea fermenter,
- replaces defective wiring,
- Burnt fuses
- Worn switches and connects electric motors.
- Repairs and installs pumps, fits water and gas pipes
- Repairs leaky joints by general fitting operation, using hand tools or by simple welding, as necessary. May clean and re-assemble refrigeration units
- Regulate boiler supply pressure and mend leaky steam pipes and joints
- Air Compressors

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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

1. ---------- is critical to personnel safety, smooth equipment operation and lasting performance. (5 points)
2. The primary objective of a planned maintenance system is to (3 point)
3. Write down at least three maintenance recommendations? (4 point)
4. Write down at least four types of Equipments preparing for maintenance? (3 points)

Note: Satisfactory rating - 10 points Unsatisfactory - below 7 points

Can ask you teacher for the copy of the correct answers.

Information Sheet 3- Selecting Hand tools.

3.1 introductions

Technicians that will conduct a maintenance activity should analyze which tools and equipment requires for the right maintenance activity. Inappropriate selection of tools and equipment will be as a source of workplace hazards..

Use of equipment and tools such as

- ❖ hand tools specialized tools
- ❖ Measuring and aligning equipment

Fig 1. Hand tools

Selected coffee shop equipment

- Pipe wrench
- Spanners sizes
- Screw drivers.
- Shifting spanner
- Wire cutters

Table -2. Hand tool inspection checklist

HAND TOOL INSPECTION CHECKLIST

Format No. :
Rev. No :
Rev. Date. :

Location / Area: _____ Date of Inspection: _____

Tool User: _____ General Frequency: _____

Inspection Conditions

Checklist						
Hand Tools / item	Checked		Checked		Checked	
	Date	OK / Not Ok	Date	OK / Not Ok	Date	OK / Not Ok
Inspected by - Signature						
Safety Manager - Signature						
Maintenance Manager - Signature						

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

1) Write down at least three examples of maintenance hand tools? (6 points)
2) Write down Use of equipment and tools for maintenance. (6 points)
3) _____Turning/loosening/tightening actions. (3 point)

Note: Satisfactory rating -≥10 points Unsatisfactory - below 7 points

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

Information sheet 4 - checking and reporting unsafe and faulty tools / items

4.1 Checking unsafe and faulty tools

The purpose of checking is to inspect unsafe and fault tools with any deterioration detected and remedied before it results in a health and safety risk. Not all equipment needs formal inspection to ensure safety andquick visual check before use will be sufficient. Risks of health and safety may arise from incorrect installation, reinstallation, any other circumstances. Inspection should be determined through risk assessment.

To ensure safe use of hand tools, remember:

- never use a defective tool
- double check all tools prior to use
- ensure defective tools are repaired

Defective tools can cause serious and painful injuries. If a tool is defective in some way, don't use it.

Be aware of problems like (**Defective Tools)**:

- chisels and wedges with mushroomed heads
- split or cracked handles
- chipped or broken drill bits
- wrenches with worn out jaws
- tools which are not complete, such as files without handles

An inspection can vary in its extent, as the following demonstrate:

- quick checks before use (eg electric cable condition on hand-held power tools, functional testing of brakes, lights on mobile machinery)
- weekly checks (eg presence of guarding, function of safety devices, tyre pressures, and the condition of windows, mirrors and CCTV on mobile plant)

- more extensive examinations, undertaken every few months or longer (eg general condition of a ladder, close examination of a safety harness, portable appliance testing)

Checking unsafe or fault tools

Watch for problems:

- Broken or inoperative guards.
- Insufficient or improper grounding due to damage on double insulated tools.
- No ground wire (on plug) or cords of standard tools.
- The on / off switch not in good working order.
- Tool blade is cracked.
- The wrong grinder wheel is being used.

4.2 reporting unsafe and faulty tools

Before you report a defective/faulty item, it will help in processing and investigating your concerns if you can also provide the following information:

- reasons you consider the faulty item to be defective
- details of any injuries or harm resulting from the defect
- a description of the defect with, where relevant, measurements (such as gaps in safeguards and the distance through such gaps to parts giving rise to danger)
- photographs of the faulty item and the defect, if available
- details of the other markings / information on the faulty item or accompanying documentation (eg type, serial number, date of manufacture)
- full contact details of the manufacturer, any supplier(s) and date of supply
- extracts from the user instructions which deal with health and safety
- details of any examinations or tests undertaken

The information on the unsafe/faulty items reports includes the following:

- Type of faulty tools and equipment
- Date / Time / Location of items
- Date and Time Reported
- Name / Address / Phone Number of Person Reporting items
- Details of faulty on tools and equipment
- Procedure Required
- Distribution of Report

Self-check 4	Written test

Name…… ID…… Date…….

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

Test I: Choose the best answer

1. To ensure safe use of hand tools, point of consideration.(3 point)

A) Never use a defective tool B) double check all tools prior to use C) ensure defective tools are repaired D) all of the above

Test II: Short Answer Questions

1) Write down the purpose of inspection? (4 point)
2) Write down at least four hand tools?(4 points)
3) Write down the information on the unsafe/faulty items reports (4 point)

Note: Satisfactory rating >10 points Unsatisfactory - below 7 points
You can ask you teacher for the copy of the correct answers.

Information Sheet 5: Planning and scheduling Maintenance.

5.1 .Maintenance planning

It can be defined as the process used to develop a course of action.

Effective maintenance planning involves the development of a course of action that includes all maintenance, repair, and construction work.

5.2 Schedule of Planning Maintenance

Maintenance scheduling follows a similar procedure to that outlined for production. It is required to know that how long a job will take, when it should be done and if resources are available. Scheduling means determining periods of inspection dates that will fulfill the frequency requirements in the most efficient way.

Maintenance schedule should be

- carried out during hours, daily weekly, monthly and annually
- planned machine stoppages such as tool changes, loading and unloading of job.
- Plan major repairs and overhauls during holidays,
- Make use of reserve plant if the need arises.

Weekly

Task schedule (marking ✓ during your maintaining

Items	Thursday	Friday	Saturday	Sunday	Monday
Grinder					
Roaster					
Roller					
Picker					
Pressure gauge					
Thermometer					

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

1) What is maintenance planning (5 point)
2) What is maintenance scheduling?(5 point)

Note: Satisfactory rating >6 points Unsatisfactory - below 5 points

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

LG #20	LO #3- Carry out routine maintenance

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Carrying out routine maintenance on equipment • Reporting maintenance information and activities 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: • Carry out routine maintenance on equipment • Report maintenance information and activities
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” . Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them. **4)** Accomplish the “Self-checks” which are placed following all information sheets. **5)** Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks). **6)** If your performance is satisfactory proceed to the next learning guide,

Information sheet 1 - carrying out routine maintenance on equipment.

1.1 Introduction

Routine maintenance: - Routine maintenance tasks refer to on-going, scheduled tasks that are performed in order to keep hand tools and basic equipment functioning properly. It could include tasks such as unblocking pipes and nozzles, sharpening blunt tools, cleaning nozzles on sprayers, checking water and oil levels in machinery, cables and plugs.

1.1.1. Carry out routine maintenance on equipment

- Prepare Schedule for maintenance
- Prepare maintenance tools and equipment
- Prepare maintenance machine
- Select hand and power tools
- Regular maintenance needed
- Schedule routine maintenance/do not schedule routine maintenance

Routine maintenance on grinder machine:

Maintenance is the procedure of finding the faults in any equipment/Machine and also r**emoval of fault.**

Objective of maintenance :

- To increase functional reliability of production facilities.
- To maximize the life span of the equipment.
- To maximize production capacity from the given equipment.
- To minimize the total production cost.
- To increase durability of machine
- To enhance the safety of the manpower

Importance of routine maintenance

- It helps in identify the cause of failure , e.g whether the failure is due to design defect, or a wear out failure.
- It helps to decide maintenance replace and repair.
- It provides the information regarding the life and reliability of the equipment.
- It initiates spare parts of equipment.
- To reduction of emergency work orders,
- Increased efficiency of equipment, and
- Replace needs equipment
- To provide training and maintenance technicians how to clean, inspect, lubricate, service, and adjust equipment, components or systems.

It is a type of preventive maintenance and also a key part of total productive maintenance in which machine operators perform small maintenance tasks to increase the reliability of the machines they use every day.

Routine maintenance tasks:

- Lubricating, cleaning, or adjusting machinery.
- Inspecting equipment to ensure proper operation and safety.
- Replacing parts that show deterioration.
- Checking, testing, and maintaining safety equipment, such as safety barriers, fire extinguishers, or alarm systems.
- Extend the life of their assets
- Reduce emergency maintenance, and
- Keep their production lines or facilities up and
- Running more consistently.

Examples of routine maintenance

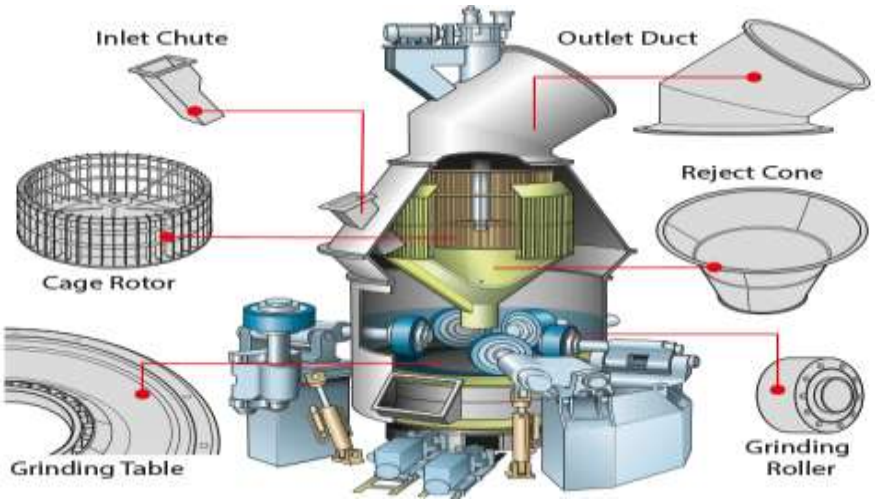

Figure 1. coffee grinder machine

The common faults of coffee grinder may develop:

- Dull blades in the grinderdull blades wil not grind the coffee correctly, will lead to a lower quality product
- Clogs and in doser mechanism, pipes in coffee machine, group head
- Loose seals and fittings
- Broken or missing parts
- Burnt out motors and Rusted metals

A check list we should have to follow for routine maintenance

Table 1. Complete a visual inspection:

Tool:	YES	NO
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 tools properly stored?		

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

1) What is Routine maintenance (5 point)
2) Write down tips on routine maintenance that we follow?(5 point)
3) Write down typical examples of routine maintenance? 5 points)
4) What is preventive maintenance? (5point)

Note: Satisfactory rating >15 points Unsatisfactory -below 10 points

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

Information sheet 2: Reporting maintenance information and activities

3.2 Reporting maintenance information:

Reporting maintenance is informing the raise problem in the maintenance routing

- Causes of Failure
- Types of Maintenance
- Materials use for Maintenance
- Type of faulty items
- Date / Time / Location of items
- Date and Time Reported
- Name / Address
- Time Taken to maintain
- Details of faulty on tools
- Procedure to maintain
- Distribution of Report

3.3 Reporting maintenance grinder activities

- Reporting Schedule

Maintenance problem which are carried out in a short period of time are known as short run production system. It may be hourly, daily, weekly and monthly.

Example:- **Hourly-** inspection of correct lubricant, level of coolant, sharpness of cutting tool.

Daily- cleaning of m/c, tightening of nuts, correct cooling, inspection of various indicators, minor adjustment of parts.

Weekly- Major adjustment, lubrication, tightening of parts.

Monthly- checking for insulation, corrosion, safety guards, checking of worn-out and distorted parts

- Lubricating oil, Repairing and replacing worn out parts and tools ,performance of each parts.

- Cleaning the interior parts of grinder.

LG #21	LO #4 - Complete maintenance tasks

Instruction sheet

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

- Ready equipment for operating
- Notifying relevant personnel
- Storing tools and materials
- Maintaining housekeeping standards
- Conducting work

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:

- Ready equipment for operating
- Notifying relevant personnel
- Storing tools and materials
- Maintaining housekeeping standards
- Conducting work

Learning Instructions:

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6) If your performance is satisfactory proceed to the next learning guide,

Information sheet 1: Ready equipment for operating

1.1. Ready equipment for operating

Identify all of these parts of the coffee machine in your workplace. identify if there are differences between your machine.

Fig 1. Coffee grinder machine

Activity of Coffee grinder

Machine Part	✔	Differences		✔	Differences
Drip Tray			Water Window		
Manual Pump Switch			On/off Switch		
Stem Wand			Hot Water Dial		
Pressure Gauge			Cup warmer		
Group Head					
Group Handle					
Steam dial on/off					

Coffee grinder

- Different equipment is used in coffee making and it is important that you know which equipment is needed for different styles of coffee.
- Most importantly, you must be able to operate the equipment correctly and carefully.
- Before you use any equipment, read the manufacturer's instructions.
- How to operate 'their' brand of machine.

- If you are unsure about how to operate a machine, always ask your trainer.
- To know how to clean your grinder properly and effective quality of coffee grinder
- To be calibrate correctly and good clean condition.

Information sheet 2: notifying relevant personnel

2.1. Notifying relevant personnel

- Turn on coffee grinder machine and allow it to build up steam pressure.
- Select correct “handle” for grinders
- Lock grinder coffee machine correctly

To ensure the quality of coffee grinder inform as the following:

- Ensure the group head is clean prior to inserting group handle
- Monitor water and pump pressure and moderate between cycles
- Analyze extraction rate and adjust where appropriate
- Assess quality of extraction visually
- Check spent grounds to identify any required adjustments to dosage and technique

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 (15 %)

1) What does mean Relevant Personnel? _____ (3 point)
2) What is Relevant Persons?_____(3 point)
3) Write down at least four key points for notifying relevant personnel?___ (4points)
4) Write down Responsibility of relevant personnel _____ (5point)

Note: Satisfactory rating >10 points Unsatisfactory - below 8 points

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

Information sheet 3. Storing tools and materials

3. 1. Storing tools and materials

Prior to storing tools, you should be aware of a kaizen principle (by using 5S) when you store tools and equipments orders.

Put tools and equipment easily available place. Prevent tools from moist area because unlike stainless steel tools are easily rust. Coated metal and carbon steel are sure to rust over time if exposed to humidity.

During storing tools and materials:

- Make sure the tools are clean and dry before oiling. Tools can be oiled with a towel or rag that is damp with oil as long as it is not damped with other chemicals or water.
- Wooden handles that show wear-and-tear should be rubbed with oil.
- Tools that have accumulated rust should be hosed down water and scrubbed a wire brush, steel until the rust is gone.
- To spray oil on screws, hinges, etc.,
- Put clean tools in an empty plastic container.
- Gloves should always be kept in a closed container in order to remove air by using vacuum suction
- Special care should be taken to store larger machines such as coffee roaster, grinder and others coffee and tea machines according to manufacturer directions.
- Tools and equipment should be kept in a cool, dry place away from humidity

Fig 2.Tools and equipments

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 (15 %)

1. What is Restoring equipment?_____ (5 point)
2. What does mean Proper storage of tools?_____ (5 point)
3. What does mean Proper storage of tools?_____(5 point)

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

Information sheet 4. Maintaining housekeeping standards

4.1 .Maintaining housekeeping standards

A housekeeping standard is a documented, step-by-step process on how to effectively perform housekeeping procedures, such as daily cleaning and maintenance tasks.

Every coffee processing professional understands that clean facilities are critical to product safety. They're also critical to the safety, health, and morale of everyone who works in your plant. The Occupational Safety and Health Administration (OSHA) issues general "housekeeping" guidelines for every workplace

Clean and dry floors: are a priority in every workspace. A new facility makes sure your floor is made of material appropriate to your plant's needs. Install proper drainage, and provide platforms for safe standing.

Effective sanitation: coffee processing facilities have to be careful about defects both for workers and plants. Remove faults tools and keep them. During sanitize coffee and tea machine care must be given.

safe storage: Ensure your routes and workspaces stay clear by providing proper storage and workshop. If that storage is overhead, make sure there's no risk of falling.

Fire awareness: fire hazards in coffee processing arise primarily from dust accumulation.

A culture of clean: best housekeeping success depends on employees' efforts and requires a culture cleaning. Housekeeping can't be a one-time thing, so that encourage by providing training and proper tools.

Ultimately, your attention to housekeeping sends a message to employees that you care about their safety and well-being in the workplace

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 II: Short Answer Questions (15%)

1) What is housekeeping SOP (5 point)
2) What does mean (OSHA)? (5 point)
3) Write down general “housekeeping” guidelines for every workplace? (5 points)

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

Information sheet 5:- Conduct work

5.1 conduct work

Conducting work with workplace environmental guidelines

Having a safe and healthy physical work environment, including amenities and facilities, is critical to eliminating and controlling risk in the workplace. This includes ensuring the work environment, facilities and amenities are compliant with legislative and other identified requirements.

To manage these issues, your disciplinary process might cover two areas: employee performance and general workplace conduct. Conduct issues might include lateness, refusal to cooperate, misuse bullying

Principles of conducting work identified as:

- Organize work to maximize efficiency and productivity;
- Train and motivate workers to implement work systems;
- Monitor both the work and work systems to ensure desired results are attained.

5.2 Point of consideration during conducting work

Nature of Work Performed

The requirements of amenities and facilities will depend on the type of work being performed and the equipment being used. For example conducting activities may need to access and change room facilities

Size and Location of the Work Area

Consideration should be given to the location such as the work area being in a building, remote area or outdoors. The work area may be multiple locations/sites over an extensive area.

Workplace

Different requirements may need to be applied where the workplace is permanent or temporary. The workplace may be permanently fixed, mobile or even temporary based

on one off work (promotional activities), seasonal work types, work involving one off situation with different duration (hours, days or weeks).

- **Access**

Consideration should be given to the ability of a person to access the amenities and facilities. The means of access to the facility or amenities should be safe and accessible for all persons who require access.

- **Maintenance**

The work environment, facilities and amenities are required to be maintained in a safe and healthy condition, and need to be hygienic, secure and in a serviceable condition. This includes replenishment of consumables, repair of broken or damaged furnishings and equipment and ensuing cleanliness of these areas

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

1. What are Principles of conducting work (5 point)
2. What does nature of work performed**?**(5 point)
3. What are Point of consideration during conducting work?(5 points)

Note: Satisfactory rating > 10 points Unsatisfactory - below 8 points

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

LG #22	LO 5: prepare for cleaning

Instruction Sheet

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

- Ready the plant for cleaning cycle.
- Making chemical stocks available for cleaning and sanitation
- Confirming available services and Ready for cleaning operation
- Planning equipment shutdown
- Taking equipment off-line
- Configuring equipment and related valves and pipe work

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:

- Ready the plant for cleaning cycle.
- Make chemical stocks available for cleaning and sanitation
- Confirm available services and Ready for cleaning operation
- Plan equipment shutdown
- Take equipment off-line
- Configure equipment and related valves and pipe work

Learning instruction

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

Information sheet 1 : Making chemical stocks available for cleaning and sanitation

1.1 Definition

Stock: means goods or merchandise kept on the premises of shop or warehouse and available for sales or distribution as well as for processing input.

Stock control is a term used to describe the measures taken to ensure that food is not kept beyond its shelf life.

It also refers to measures taken to prevent certain types of contamination especially during storage, defrosting, hot holding, service and transportation.

1.2 **Cleaning**

Cleaning is a process which will remove soil and prevent accumulation of food residues which may decompose or support the growth of disease causing organisms or the production of toxins.

1.2.1 Considering a good cleaner the following properties should be:

- Quick and complete solubility..
- Dissolving action of food solids.
- Good rinsing properties.
- Complete water softening power.
- Noncorrosive on metal surfaces.
- Germicidal action.
- Economical to use.

  Chemical stocks
- Deteregent
- Degreaser
- Abrasive
- Acids

Table 1. Cleaning agents

Type of Cleaning Agent	About the agent
Detergents	• Most common type of cleaning agent • Used in homes and commercial kitchens Detergents break up dirt or soil, making it easier to wash away • Usually synthetic agents made from petroleum products • May be in the form of powder, liquid, gel, crystals
Degreasers	• Also known as 'solvent cleaners Used to remove grease from surfaces such as oven tops, counters and grill backsplashes • Methylated spirits or white spirit were commonly used as degreasers in the past • Most businesses now use non-toxic, non-fuming degreasers to prevent chemical contamination
Abrasive	• Substances or chemicals that depend on their rubbing/scrubbing action to clean dirt from hard surfaces • Usually used to clean floors, pots and pans • Use with care as abrasives may scratch items made from plastic or stainless steel
Acid	• Most powerful type of cleaning agent • Used to remove mineral deposits • Useful for descaling dishwashers or removing rust from restroom facilities • Use with care! If not diluted properly, acid cleaners can be very corrosive and poisonous

Self-check 1	Written test

Name…… ID…… Date…….

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

Part I: Short Answer Questions (5 pt. for each)

1. Define stock?
2. What are the factors affecting cleaning efficiency?
3. Write the Considering a good cleaner properties**?**
4. Describe the cleaning agent

Satisfactory rating >18 point unsatisfactory rating ≤15 point

Information sheet 2	Confirming available services and ready for cleaning operation.

2.1 Steam

Steam is a convenient means to convey energy in food processing operations. It is produced from inexpensive and abundant water. Pressure control valves can be used to precisely regulate and maintain the temperature of steam. Large amounts of energy are contained in a relatively small mass of steam, so heat transfer equipment can be compact. Steam is easily and inexpensively conveyed over fairly long distances and into remote locations of the process.

Steam can be used in most applications that do not involve contact with food products or with surfaces that contact food products.

2.2 Compressed air

Compressed air or gas is introduced intermittently at high velocities through nozzles present at the bottom or side of the silo, to mix powder materials that exhibit expansion characteristics when aerated.

Particles are reoriented in relation to one another as a result of the expansion of a powder bed by gas. The nozzles are arranged in a manner that escaped air stream in vertical motion gives a chance for powers to settle. To achieve mixing, the system employs blower or compressor to generate airflow.

2.3. **Water** : Process water covers the wide range of boiler feed water, cooling water for heat exchangers or engine, chemicals dilution, process water is required for washing the green coffee bean .in coffee and tea processing plants water used for brewing /cupping.

2.4 **Gases** for food industry are widely used in producing, packing, storing and transporting various food products. These gases are important in ensuring the quality of products and facilitation of production processes

2.5 Electricity

Electrical power in food processing plants is needed for running the motors of the processing, control, and service equipment, for industrial heating, and for illumination. For a medium size food plant processing about 100 tons/day raw materials, the power requirement may of the order of 500 kW. A standby power generator of about 200 k VA is recommended for emergency operation of the main plant, in case of power failure or breakdown.

Self-check 2	Written test

Name…… ID…… Date…….

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

Part I: Short Answer Questions (5 pt. for each)

1. Write the importance of compressor air ?
2. Describe Common services required to cleaning operation

Satisfactory rating >8 point unsatisfactory rating ≤6. point

Information sheet 3	Ready service for cleaning operation

Information sheet 4	Planning equipment shutdown

Shutdown Planning

The Planning phase is all about identifying the shutdown work scope, then identifying parts, labor, equipment and other resources required to carry out the shutdown. The output of the planning phase is a set of comprehensive shutdown work packs, assurance that everything is available to carry out the work. It is imperative that a specialist planning team is assigned to this phase. That is to say, do not try to use the routine planners to carry out the shutdown planning 'in their spare time'. The nature of shutdown planning requires laser focus, and the planners must not be distracted by other routine activities.

4.2 Equipment

Coffee roaster, grinder, sorter, roller , coffee packaging .Cleaning equipment, , heavy lifting equipment, hand tools, specialist tooling. The list goes on when it comes to equipment requirements. It is important that all equipment requirements are identified for all shutdown jobs as early as possible, as some of these may require a lengthy process to properly organize.

4.2 Shutdown Scheduling

it is important that a dedicated shutdown scheduling is appointed. The required skill set for a shutdown scheduler is different than for a shutdown planner, thus it is better to have separate planners and schedulers. The core task of the Shutdown Scheduler is to activities. Other core activities during the scheduling phase are:

- Ensure the full scope of work can be carried out within the allocated time.
- Define the timing requirements for all parts, labor, equipment, and other resources for execution of shutdown maintenance activities.
- Define the critical path activities for the shutdown.

- Sequence the work to optimize the use of all shutdown resources, often referred to as resource leveling.
- Identify shutdown job priorities, and utilize float to schedule shutdown work in accordance with priorities.

Self-check 4	Written test

Name…… ID…… Date…….

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

Part I: Short Answer Questions (5 pt.)

1. Describe Shutdown planning

Information sheet 6: Configuring equipment and related valves and pipe work

6.1 **prepare Equipment for cleaning**

In carrying out the fluid power assembly operations, required to follow specific assembly techniques in order to assemble the various components, which will include rigid and flexible pipework, hoses, valves, actuators and cylinders, regulators, switches and sensors. The assembly activities will also include making all necessary checks and adjustments to ensure that fluid power components are correctly positioned and aligned are dimensionally accurate and secure; pipework is dimensionally accurate and free from ripples, creases and damage; and joints are checked for security, with threaded devices tightened correctly. You will also be expected to carry out appropriate test procedures (such as leak or pressure) to confirm that the fluid power assembly meets the operational performance required.

Self-check 6	Written test

Name…… ID…… Date…….

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

Part I: Short Answer Questions (5 pt.)

1. Why assembly activities checks and adjust for cleaning operation?
2. Fluid power assembled what is the reason behind?

3.

LG #23	LO 6: operate and monitor the cleaning process

Instruction sheet

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

- Undertake cleaning cycle
- Monitoring cleaning process
- Recording cleaning data
- Identifying, rectifying and reporting out-of-specification process and 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:

- Undertake cleaning cycle
- Monitor cleaning process
- Record cleaning data
- Identify, rectify and report out-of-specification process and equipment performance

Learning instruction

3 Read the specific objectives of this Learning Guide.

4 Follow the instructions described below.

5 Read the information written in the information Sheets

6 Accomplish the Self-checks

Information sheet 1 : Undertake cleaning cycle

1.1 Definition

Clean –out of place : Manufacturers use COP methods for pieces of equipment and utensils that cannot be cleaned where they are used and must be disassembled, and for pieces of equipment and parts that do not lend themselves to easy cleaning in place. Fittings, clamps, impellers, hoses, etc. may need to be cleaned in this manner. COP equipment that delivers consistent cleaning and sanitation ensuring food safety and quality. Because the process involves manual washing and several steps, the workflow must guard against overspray and improper stacking of cleaned parts, which can lead to recontamination. It is vital to understand, establish and follow a pre-determined COP procedure to avoid cross-contamination.

Clean-in-place is best used in conjunction with smooth-surfaced components – such as tanks, pumps, and process piping – that are too deep, long, or self-contained to reach manually. The process also presents an efficient way to clean parts that would require much time or effort to disengage from the line. These systems use chemicals, detergent and heat to clean the interior surfaces that come into contact with the product to prevent contamination and eliminate bacteria.

1.2 The cleaning operation:

1. **Prewash** - the removal of gross food particles before applying the cleaning solution.
2. **Washing** - the application of the cleaning compound. There are many methods of subjecting the surface of equipment to cleaning compounds and solutions. Effectiveness and the economy of the method generally dictate its use.

A. **Soaking** - immersion in a cleaning solution. The cleaning solution should be hot (125 degrees Fahrenheit) and the equipment permitted to soak for 15 - 30 minutes before manually or mechanically scrubbed.

B. Spray method - spraying cleaning solution on the surface. This method uses a fixed or portable spraying unit with either hot water or steam

Method of CIP cleaning

- ✓ Sanitary process lines
- ✓ Vessels
- ✓ Equipment commonly used in process plants
- ✓ without having to remove or disassemble piping or equipment to accommodate cleaning.
- ✓ CIP Systems pump cleaning, rinsing, and sanitizing solutions through the same piping path as the product to eliminate product soil from all internal surfaces.

Figure 1: CIP system

1.2 Cleaning procedures

As part of a normal production cycle, for example, between product runs, it is standard procedure to finalize the production cycle by pushing out the food product with water before the cleaning procedure starts. The procedure for cleaning a plant often follows these steps.

Step 1: Pre-rinse The pre-rinse is a very important step in the CIP process because a well-monitored and well-executed

Step 2: Caustic Wash – (140° – 185° F) Caustic washes soften fats, making them easier to remove. Also known as caustic.

Step 3: Intermediate Rinse Fresh water flushes out residual traces of detergent remaining from the caustic

Step 4: Final Rinse

Figure 1: cleaning step

Self-check 1	Written test

Name…… ID…… Date…….

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

Part I: Short Answer Questions(3 pt. for each)

1. Write the difference between CIP and COP?
2. Write advantages Of A CIP System**?**
3. Write procedures of CIP cleaning?
4. Which cleaning method is more complex and coasty?

Part 2. Choose the baste answer (1. pt.)

1. A cleaning compound that is good at mineral deposit control is

A. Surfactants B. Chelating C. Acid **D.** Basic Alkalis

2. The correct procedure in the cleaning operation is:

A. Prewash, wash, rinse, and air dry

B. Prewash, wash, sanitize, rinse, and air dry

C. Prewash, wash , rinse, sanitize, and air dry

D. Prewash, wash, and air dry

Satisfactory rating >10 point unsatisfactory rating < 8 point

Information sheet 2 : Monitoring cleaning process

2.1 Monitoring cleaning process

Monitoring the cleaning processes ensures the process is performed correctly and also provides an early warning if it is not performing as validated.

Importance Monitor the Cleaning Process

- Control over a cleaning process can be demonstrated by a review of all relevant data at specified time increments. Relevant data includes sample results and trending of those results.
- Provides additional reassurance to the visual assessment and conductivity verification that is performed with each cleaning.
- Consistent with the lifecycle approach to validation (Design, Formal Validation Studies, and Ongoing Controls) as well as continuous improvement for manufacturing quality and efficiency

2.2 Monitoring the process

- chemical strength
- cycle time
- temperatures
- time
- storage tank levels
- control panels and systems

chemical strength

The type of chemical being applied will affect how the soil is removed from the surface. Understanding how to utilize the right chemical is critical in achieving the desired level of clean. Titration kits help with the initial understanding of how to obtain the best results and how they can be achieved. This will allow you to check for alkalinity, water hardness, pH levels, iron content, chlorine presence and sour levels.

Cycle Time

Time is the duration allotted to a cleaning task. The results in the cleaning process rely heavily on the amount of time spent. If you increase the amount of cleaning time, the chemistry behind the product has a better chance of breaking up soils and being more effective.

Temperature

Higher temperatures aid in chemical productivity. To put it simply, the cleaning process becomes faster and easier as temperature increases. Higher temperatures also decrease the viscosity in soils, allowing for easier removal. In order for the chemicals to work, the temperatures for each machine type need to be accurate. Heat erating costs and can harm certain surfaces.

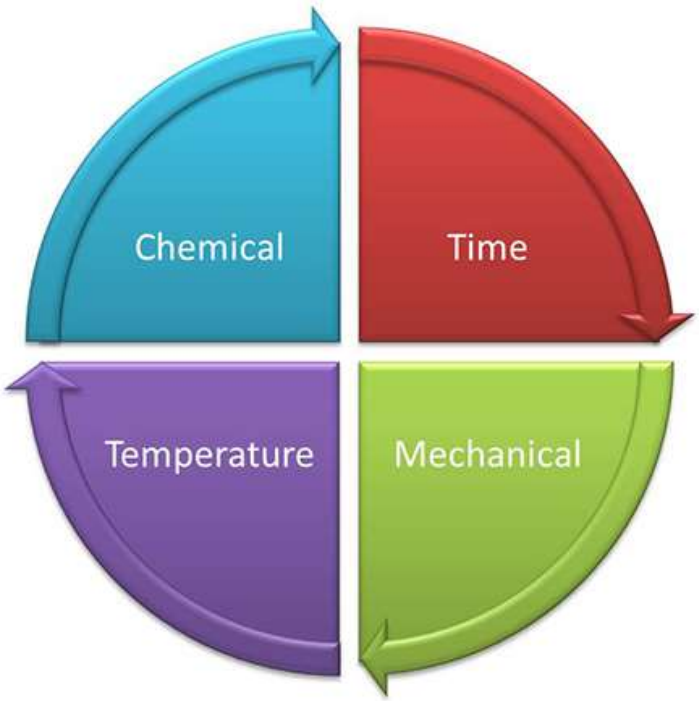
storage tank levels/mechanical

Desired results occur when optimal chemical reaction and mechanical action takes place. Agitation can help break up soils, increase wash efficiency and reduce wash time. Too much mechanical action can result in damaged surfaces, resulting in higher equipment and maintenance expenses. During the ware washing process, agitation typically occurs first with pre-scraping to remove stubborn food deposits. A specific amount of pressure is required to affect the response rate.

Control panels and systems

Improper procedures can negate all the positive qualities of the other factors. In-service training and reinforcing the five factors of cleaning is the best way to have a positive impact on your operation's effectiveness. It is important to note that the reduction of any one of the five factors must be balanced by an increase in one or more of the remaining factors.

- **Disinfection** is the process by which microorganisms are killed so that their numbers are reduced to a level which is neither harmful to health nor to the quality of perishable goods. Following cleaning, surfaces will be free from soil but microorganisms remain. Using validated disinfectants on surfaces, following the instructions and contact times, reduces microorganism levels to the required level for food production.



The method by which disinfectants kill the microorganism referred to as their "mode of action" varies with the active ingredient. When selecting a disinfectant, a number of considerations need to be made. Application, including the compatibility with materials found in the area being disinfected

- ✓ Temperature required
- ✓ Impact of water hardness
- ✓ Required concentration
- ✓ Toxicity
- ✓ Leftover residues

Above all, the approvals each disinfectant has should be taken into account during selection.

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(5 pt. for each)

1. Define monitoring cleaning process?
2. Explain briefly factors affecting cleaning process?
3. Write the cleaning agent ?
4. What is the Importance of Monitor the Cleaning Process?

Satisfactory rating >18 unsatisfactory rating <10

Information sheet 3: Recording cleaning data

3.1 Cleaning Process Record Keeping

Records must be kept showing the equipment numbers, the date of cleaning, who cleaned it and who inspected/tested it.

3.2 Operators are Important

- They verify that it passes other analytical testing such as conductivity
- They verify the equipment is visually clean
- They should be the ones to notice a change in the internal surfaces.
- They can recommend changes to the procedure
- They have the most contact with the equipment

Example: Failure to clean and maintain equipment and utensils used in the production of drug products in order to prevent contamination. For example, deteriorating equipment was observed, including: tape flaking off filling equipment directly above an uncovered hopper containing product to be filled, a leaking gasket in the product transfer line during filling, and two leaks in the Purified Water system. While your response appears adequate, we are concerned about the condition of your manufacturing facility in that during the inspection our investigators observed multiple conditions of disrepair.

3.3 Cleaning data

Signs and symbols: Ultimately, signs and symbols act as bridge from the material world to abstract. Symbols tie thought to action, regulate social experience, promote self-expression, shape individual and cultural identity, and represent power and authority.

Materials Safety Data Sheets (MSDS)

on the best way to manage and store chemical substances in a safe and secure manner. The MSDS also state what you need to do if the chemical is ingested or makes contact with a person's skin

Standard Operating Procedures (SOPs) – Sanitation Standard Operating Procedures (SSOPs) are part of documented GMPs for hygiene and sanitation, required to meet regulatory requirements for food control. The written SSOP plan should explain the sanitation concerns, controls, in-plant procedures and monitoring requirements. They are also required to monitor these conditions and practices, correct unsanitary conditions and practices in a timely manner, and maintain sanitation control records

Specification- is exact statement of the particular need to be satisfied, or essential characteristics that customer requires (in a good, material, methods, process, service ,or work)

Production cleaning schedules and instructions -Production Scheduling is the allocation of raw materials, resources, and processes to produce products for customers. The purpose of production scheduling is to make manufacturing process flow with maximum efficiency, by balancing the production needs with your available resources in the most cost-effective manner.

Manufacturers' advice: Cleaning in the food industry is not an easy task. However, it is a critical step within food production since it is crucial to maintain and guarantee food safety. Understanding various soil challenges, why we clean and how detergents and disinfectants work is key to ensuring a safe, hygienic

Table 2: Equipment cleaning check list
Operation name ----------year----------

Types of equipment	Date cleaned	By

Additional notes and observation:

Table 3 : daily cleaning and disinfection check list

Area	Monday	Tuesday	Wednesday	Thursday	Friday
Mid-day					
At closing					

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(6 pt.)

1. **Explain importance of Recording cleaning data**

Satisfactory rating 6 point unsatisfactory rating <4 point

Information sheet 4 : Identifying, rectifying and reporting out-of-specification process and equipment performance

4.1 Introduction

The term out of specifications, are defined as those results of in cleaning process or finished product testing, which falling out of specified limits. The out of specifications (OOS), arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When an out of specifications (OOS) has arrived, a root cause analysis has to be performed to investigate the cause for OOS for cleaning process and equipment performance. the build-up of coffee oils over time can mean the grinder giving a poor performance .

Specifications

- Up-to-date specifications shall exist for all:
- Raw materials including packaging materials;
- Finished products; and
- Intermediate products when appropriate.
- All specifications shall be pertinent and thoroughly defined, and shall ensure compliance with the QMS and food safety
- guidelines of the organization as well as other regulatory requirements
- All specifications shall, when appropriate, be formally agreed to with customers or any other required person, company or organization.
- The operator shall operate a specification review procedure for its customers and shall have all appropriate documentation relating to product quality and safety.

4.2 Rectifying out-of-specification cleaning process outcomes

At its core, problem solving is a methodical four-step process. You may even recall these steps from when you were first introduced to the Scientific Method.

- First, you must **define** out-of-specification process outcomes. What is its cause? What are the signs there's a problem at all?

- Next, you **identify various options** for solutions. What are some good ideas to solve this?
- Then, **evaluate your options** and choose from among them. What is the best option to solve the problem? What's the easiest option? How should you prioritize?
- Finally, **implement the chosen solution**. Does it solve out-of-specification process outcomes? Is there another option you need to try?**.**

Operation Sheet: operate and monitor the cleaning process

Operational title: **CIP Cleaning Cycle**

Objectives; to know the cleaning in- place

Procedures for CIP cycle

Step 1. The plant is first pre-rinsed with water at 40-60 °C, to remove sugar and melt any fats. The temperature should not exceed 60 °C in order to avoid denaturing any native proteins, which would then become much more difficult to clean.

Step 2. Alkaline detergent is then circulated in the system to remove organic soil such as proteins and fats. Alkali is added to the concentration set-point and the temperature is raised to the temperature set-point. The flow is kept at a level giving satisfactorily flow velocity. The alkali step lasts for a pre-set time period.

Step 3. Water is then used to purge out the alkaline detergent plus the dissolved soil.

Step 4. Acidic detergent is then most commonly circulated through the plant to dissolve mineral deposits and lime scale deposits caused by hard water. The frequency of applying an acidic step depends on whether the surfaces are hot or cold, the type of food and the water quality.

Step 5. Water is then used to purge the acidic detergent and rinse out dissolved soil. The final water rinse must also ensure that any detergent residues are removed and only water is left in the plant. Now the plant should be visibly clean.

LAPTEST	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: monitor cleaning process

LG #24	LO 7: Dispose of waste and return plant to operating condition

Instruction sheet

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

- Flushing and disposing cleaning chemicals from plant
- Conducting work
- Setting up plant

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:

- Flush and dispose cleaning chemicals from plant
- Conduct work
- Set up plant

Learning instruction

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below.
- Read the information written in the information Sheets
- Accomplish the Self-checks

Information sheet 1: Flushing and disposing cleaning chemicals from plant

1.1 Cleaning chemicals

Chemicals are effective against the most common foodborne pathogens, there are a few that are most frequently used chemicals Sodium Hypochlorite, Ammonium Hydroxide (Ammonia), Propellant Gas, Phosphates

Table 4: required cleaning chemical

Cleaning and sanitizing agents required for cleaning the production areas floor			
Product Name	Purpose	Methods of application	Concentration/formulation
Potable water	Rinsing	High pressure on non-product area	
Sanitizer/chlorine	Disinfectant	Chelating agent	as per label instruction
Detergent (caustic soda, caustic potash, coronate, silicate, phosphate)	Sequestering agent		

1.2 Cleaning methods

1.2.1 Wet/ Hydraulic Cleaning Methods

- Flushing is the oldest and effective pipe cleaning technique, cleaning an existing pipe inexpensively.
- It helps to remove disinfectant residual , expel harmful bacteria, remove suspended sediment, and clear up other problems of water discoloration or objectionable taste and odor.

- It can also help to clean the pipes by lifting loose sediments, reduce chlorine demand, and mitigate water quality risks. This technique cannot clean away tuberculation and other hard scales.
- It is not effective in cleaning sediments and bio films from large pipes. Moreover, it cannot solve stem from source water problems, treatment deficiencies, cross connections, and unlined cast iron pipe

1.2.2 Techniques of Flushing on coffee processing industry

There are two techniques available in flushing which are

- **Conventional flushing** is nothing but opening up one or more fire hydrants and allowing the water to run in to the sewers until the sediments, bio films and poor quality water are removed.
- **Unidirectional flushing** is a technique in which valves are closed and fire hydrants are opened in a systematic way. Initially, the water travels towards hydrant in a single direction. Water in single direction produces high velocities in the main, which makes the cleaning more effective. Used Different combinations of detergents and sterilants at different temperatures allow flexibility in operation Figure 1 presents the flushing operation and different nozzles for flushing

Figure 1: Flushing Operation and Different Nozzles

1.2.3 Coffee Grinding cleaning steps : grinder cleaning schedule to keep them in prime condition:

Daily/after each use:

The coffee chute is sealed off and excess coffee is ground.

– Make sure you grind off as much as possible during this step, to avoid excess coffee being inside the grinder or coffee beans sitting on top of the burrs for the next step.

1. Turn off the power.
2. Remove hopper.
3. Coffee is removed and sealed in a bag. Remember to keep your unground coffee sealed off and in a cool, dark place to keep it fresh. Avoid your refrigerator though.
4. If it's a manual dosing grinder, the blades are plunged.
   – This is the step that cleans inside the grinder When plunging, removing a small portion of the grinds within the grinder. need to put the hopper back on and activate the grinder for a few seconds. Then repeat the above step a few times to get it really clean.
5. If it's an auto dosing grinder, grab a vacuum:
   - Use a nozzle attachment for your vacuum. Put the hopper back on, expose the grill where the coffee drops out and hold the vacuum to it. Activate the grinder to thoroughly remove all the coffee, and persist until you can only see metal around the grill. Be aware, some vacuums won't handle this well and using a commercial vacuum is recommended.
6. Wash your hopper to remove all the chaff. Make sure you thoroughly dry the hopper before putting it back on the grinder.
7. Reassemble the grinder.
8. Wipe out the dosing chamber with a damp cloth. This is enough cleaning to see a measureable result in quality. need to disassemble the unit. For the brave and/or knowledgeable, disassembling the grinder is recommended at regular intervals (weekly to monthly) reassembly.

1.2 Dry cleaning

- Dry cleaning procedures are used for products that are smaller, have greater mechanical strength and possess lower moisture content (for example coffee and tea powders).

- After cleaning, the surfaces are dry, to aid preservation or further drying.
- The main groups of equipment used for dry cleaning are:

✓ air classifiers

✓ magnetic separators

✓ separators based on screening of foods

1.3 Importance of disposal cleaning chemicals

The correct disposal of chemical cleaning products can help to prevent damage to the environment caused by chemicals entering water supplies or food chains, which could either eventually or immediately cause damage to wildlife or humans.

Self-Check 1	Written test

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

Part 1: write short answer(3 point for each)

1. Write the three steps of Disposal of industry chemical?
2. Explain briefly Techniques of Flushing on coffee processing industry?
3. Define the word flushing?

Note: **Satisfactory rating - 8 points** **Unsatisfactory – below 6 points**
points

Information sheet 2: Conducting work area

1 .1. Definition

Environmental Requirement means any Environmental Law, agreement or restriction (including but not limited to any condition or requirement imposed by any insurance or surety company), as the same now exists or may be changed or amended or come into effect in the future, which pertains to health, safety, any Hazardous Material, or the environment, including but not limited to ground or air or water or noise pollution or contamination, and underground or aboveground tanks.

1.3 **Maintain cleaning production areas**

- A clean workplace is necessary for a safe work environment – accidents and injuries are avoided and productivity is improved where good housekeeping is a daily occurrence. Such procedures will help promote the best use of limited space, keep materiel
- Guidance Clean food processing areas, facilities and equipment in accordance to the cleaning programed. Frequency should be often enough to minimize or prevent cross contamination of product.

Regularly clean and sanitizes other items that may contaminate products indirectly (e.g. handles of doors and refrigerators, taps, hand wash basins etc.). The effectiveness of cleaning and sanitation can be verified by direct or indirect microbiological testing (e.g. using swabs) of the relevant environment and contact surfaces.

Operators may choose to incorporate existing documented information into their cleaning and sanitation programed by referenceal storage to a minimum, decrease energy costs, and minimize property damage.

1.3 coffee production area cleaning procedure

1. Ensure that all open food has been removed from the area.

2. Dismantle, and remove to the appropriate hygiene area, all machine parts that require cleaning separate from the machine. Cleaning can then commence on these items.

3. Remove all containers of used paper towels to the appropriate waste product collection point.

4. Remove all unused paper towels from their containers and place them in a secure position to prevent them becoming wet and spoilt.

5. Remove all waste receptacles with waste to the appropriate disposal point .

6. Remove all loose soils and collect them into suitable containers for disposal.

7. Check and clean out all drains and drainage channels.

8. Rinse all surfaces with water and then apply a foam detergent starting at the highest point and then working downwards.

9. Leave the foam to act for a minimum of 15 minutes and afterwards clean using a pressure lance.

10. While waiting for the foam to react with surface soils commence cleaning of machines and large items which cannot be moved, including conveyors, wash hand basins, sterilizers, sinks, scales, tables etc. Commence hand scrubbing on obvious stubborn soils

11. When all surfaces have been effectively cleaned and rinsed, apply sterilant to all cleaned surfaces.

12. Ensure that all surface water has been squeegeed from floor.

13. Cleaning check sheet to be completed and signed.

Self-Check 2: Written test

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

Part 1: write short answer

1. How to conduct the working area during cleaning process?(5 pt.)
2. Write the steps of coffee production area cleaning?(5 pt.)

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

Information sheet 3: Setting up plant

3.1 Introduction

Plant effluents consisting mainly of wastewater, but including solids and gas wastes require special handling and treatments to comply with the local laws and regulations.

Food plants should be designed and operated so that a minimum pollution is caused to the environment. The Environmental Protection Agency (EPA) in the US has issued codes and regulations that ensure the quality of natural water bodies is not damaged by effluent discharges from industrial plants. Similar regulations apply to atmospheric emissions of objectionable gases and dust. Environmental information needed to comply with EPA regulations for wastewater includes testing for pH, temperature, biochemical oxygen demand (BOD), fats oil and grease (FOG), and total suspended solids (TSS). Coffee waste waters are high in organic loadings and exhibit a high acidity. When washed or semi washed coffee is processed in large quantities, untreated effluents greatly exceed the self-purification capacity of natural waterways. In order to overcome the pollution potential of processing waste waters, a clear understanding of waste water constitution in inevitable to design a feasible treatment system. Especially when expanding wet coffee processing or setting up new large scale processing operations, treatment of waste waters needs to be considered. First, the amount of sediment able solids contributing to COD loading of waste water need to be lowered. This is achieved during a sufficient time of acidification of sugars present in the waste water during which solids get out of solution. After full acidification, the clear, acid waste water is treated by natural limestone to lift the pH from around 4 pH to a pH to around 6. Only at this pH levels, Upflow Anaerobic Sludge Blanket (UASB) digestion and constructed wetland will achieve optimal results. The UASB technology is central in the treatment process as the highest reduction of BOD levels in relatively short times are achieved. Effluents from the UASB digester are high in phosphates and still reveal a BOD which needs to be treated in secondary treatment. Secondary treatment and consumption of phosphates is accomplished in a locally adopted constructed wetland using macrophytes to alter aerobic bacterial decomposition of organic matter. Before

disposed, waste water tertiary clean up and dilution of BOD loadings is achieved by leading waste waters through a pond of water hyacinths. Only after this multi step clean up, water is safe to re-enter natural waterways.

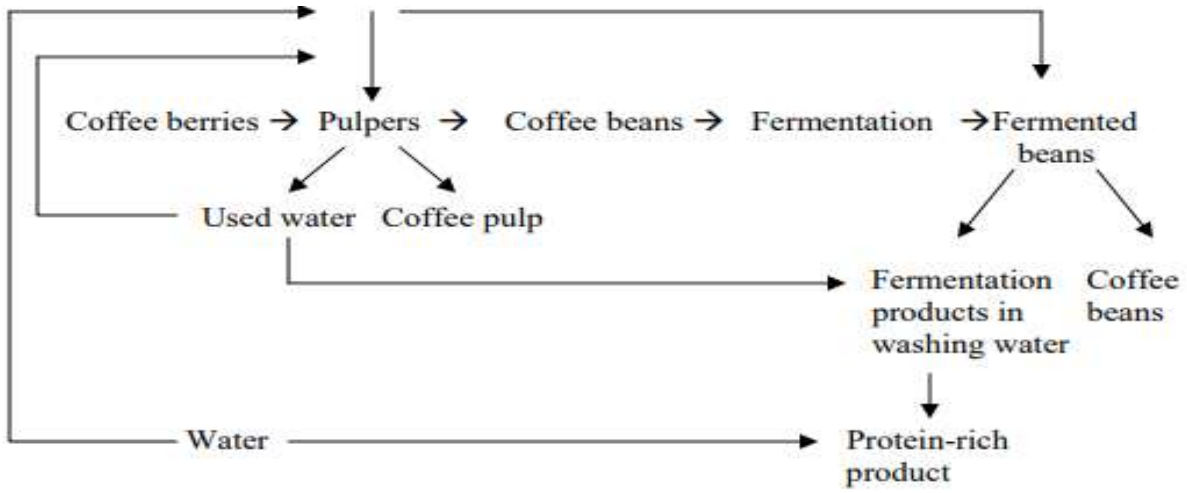


Figure 6: Water usage in a coffee processing system using the wet fermentation

Self-Check 3	Written test

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

Part 1: write short answer

1. Write the difference between COD and BOD?

Reference

1. Newcomer,J.L. 1981. Preventive maintenance manual for Dairy Industry Venus Trading Co. Anand, India.

2. IDF. 1990 Handbook of Milk Collection in Warm Developing Countries. IDF Special Issue 9002.

3.0'Mahony, F Rural Dairy Technology: Experiences in Ethiopia. ILCA Manual No 4 Publ. ILCA, Addis Ababa, Ethiopia.

4. Cowan, C.T. 1983. Avoiding Corrosion and damage to Homogenisers. In: Selected case of Corrosion in the Dairy Industry. Brochures 7-11. IDF Doc. 161

5. Ibid. Corrosion prevention in UHT Indirectly Heat Milk Sterilisers. In: Selected cases of Corrosion in the dairy industry. Brochures 7-11. IDF. Doc 161
https://www.slideshare.net/AbhinavVivek1/packaging-materials-for-dairy-products
[1] Newcomer, J.L., 1969. Indian Dairyman, vo1. XXI, No. 1 to 6.

WEB ADDRESSES

1. **FMD Design Standards**http://www.iftsa.org/outreach/so/labs/wa/
2. http://www.iitb.ac.in/safety/sites/default/files/Machine%20Safety_0_0.pdf)
3. https://www.fda.gov/media/109408/download
4. https://www.flexiblemachining.com/pdf/quality_policy.pdf
5. https://www.slideshare.net/AbhinavVivek1/packaging-materials-for-dairy-products