Oil Seed and Pulse processing Level II

Based on September 2019, Version 2 Occupational standards

Module Title: Operate Roasting process
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LG #32	LO #1 Prepare the oil seed roasting equipment and process for operation

Instruction sheet

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

- Confirming raw materials and ingredient
- Confirming available materials
- Confirm maintenance and roasting requirements
- Addition of different Ingredients
- Confirming available services
- Fitting and adjusting machine components
- Operation of equipment Parameters
- Performing Oil seed roasting equipment
- Carrying out pre- start checks

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

- Confirm raw materials and ingredient
- Confirm available materials
- Confirm maintenance and roasting requirements
- Addition of different Ingredients
- Confirm available services
- Fit and adjust machine components
- Operation of equipment Parameters
- Perform Oil seed roasting equipment
- Carry out pre- start checks

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

Information Sheet-1 Confirming raw materials and ingredient

1.1 Introduction

Roasting is the key unit operation in converting green oil seed into flavorful roasted. During industrial processing of oil seeds and nuts to produce edible oils, roasting is often applied before oil extraction. Moreover, seeds and nuts are generally consumed as snack food after appropriate roasting. These processes affect both the seeds and their extracted oils in many ways. Beside changes in macronutrients such as protein denaturation/degradation, oil oxidation, sugar pyrolysis and Millard reactions, minor constituents such as fatty acids, sterols, phenolic compounds are also affected by roasting. Antioxidants are components which prevent auto-oxidation of oils and fats by giving their hydrogen to free radicals formed in the initiation and propagation stages of autoxidation. One of the most important requirements for a suitable antioxidant in oils and fats is the thermal stability during heat processing. The oxidative reaction is responsible for rancid odors and flavors within fats and oils which reduces nutritional quality of foods. Oxidation reactions consist of auto-oxidation, photo-oxidation, enzymatic oxidation and ketonic oxidation, whereas auto-oxidation is the most common deterioration during storage of edible oils. Autoxidation is the reaction between oxygen and unsaturated fatty acids via an auto-catalytic process consisting of a free radical chain mechanism. This chain includes initiation, propagation, and termination reactions that could be cyclical once started.

Some of the raw materials are:

- Cleaned ground nut,
- Cleaned Sunflower
- Cleaned Rapeseed
- Cleaned Soybean
- Cleaned sesame seed,
- Cleaned Niger seed and etc…

1.2 Importance of roasting Oil seed

The methods give rise to roasted products having desirable characteristics including,

- improved flow ability,
- Improved taste,
- Improved aesthetic qualities,
- sterility
- Moreover, the roasted products can be more easily broken chewing or processing, for example to produce a corresponding flour.

1.3 Pre-processing methods of oilseed roasting

- Receiving the raw materials
- Weighing
- Testing the physical and chemical properties of the raw materials
- Cleaning the raw materials
- Crushing the raw materials
- De hulling/ flaking
- Grading
- storing
- and other processes

Pretreatment process

Oil seeds→ cleaning→ stones removal→ magnetic selection→ cracking→ softening→ flaking→ cooking/Roasting→ to oil press/extraction workshop.

a. **Cleaning device**: To remove various impurities in oil seeds, such as: iron, stones, clump, such as the plant leaf, clean up till impurity content does not exceed 0.2%.
b. **Crushing machine**: Oil seeds are crushed into 6-8 pieces. In order to meet the requirements of crushing, For instance: the peanut is suitable for crushing with the moisture of 7% to 12%.
c. **Softening Process**: The purpose of softening is to adjust the moisture and temperature and make it soft.

d. **Flaking process**: Rolling raw material into flakes and the purpose is to increase surface area, destroy the cell tissue, and shorten the way of oil out from cake.

e: Cooking process: Use steam cooking, inject direct steam and cook the flakes to meet the requirement of oil press.

Self-Check 1	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (5 points each)

1. Write the importance of roasting oil seed.
2. Write some of the pre-processing methods of roasting oil seed.

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

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

Information Sheet- 2 Confirming available materials

2.1 Introduction

In industrial processing of oil seeds to produce edible oils, roasting is often applied before oil extraction. The oil seeds roasting machine can be used for roasting many kinds of oil seeds, such as cotton seeds, peanuts, sesame seeds. Most oil seeds need to be roasted to press more thoroughly and get high oil yield. It is manual control of electromagnetic heating equipment, when you fried different crops; the temperature should adjust according to the needs. This roaster machine utilizes drum horizontal structure, uniform heating for roasting material, automatic rotation, and automatic stir, roasting and discharging. When working, the drum will rotate continuously, roasting material from all different directions. When the frying is finished, just roll back the machine, and all materials will be pouring out.

2.2 Available Materials Used for Roasting Oil Seed

Roasting requires a higher temperature than baking in order to generate a flavorful crust on the surface of the food, and the roasting process sometimes covers the surface of the fan with fat (butter or oil), which is not required in the baking process, in order to reduce the loss of moisture. Different types of roasters are available. Continuous roasters are used in large scale processing plants because these have greater efficiency, and ensure better uniformity than batch-type roasters. Continuous roasters consist of either a perforated drum or a cylinder for roasting and subsequent cooling of the oilseed.

Fig.1. Roasting oil seed machine

Advantages of the Oilseed Roasting Machine

- Wide application for various oil bearing materials.
- Simple and reasonable structure: It changes the single outlet into double outlet, increase the input diameter and achieve the fast input and fast output.
- Time and labor saving, easy operation and high efficiency: The roaster is closed that can control the heat to go out and achieve the steaming and roasting function, speed up the roasting seeds.
- Continuous turning working: Materials roasted turned constantly, make its surface uniformly touch with pan area and avoid that flat pan roasting seeds not uniform and flammable and scorched, so it develops the oil output and oil quality.

Different oil seed roasting equipment/Machine may use for roasting different oil seeds types. For instance see below figure

A. chickpea roasting Machine

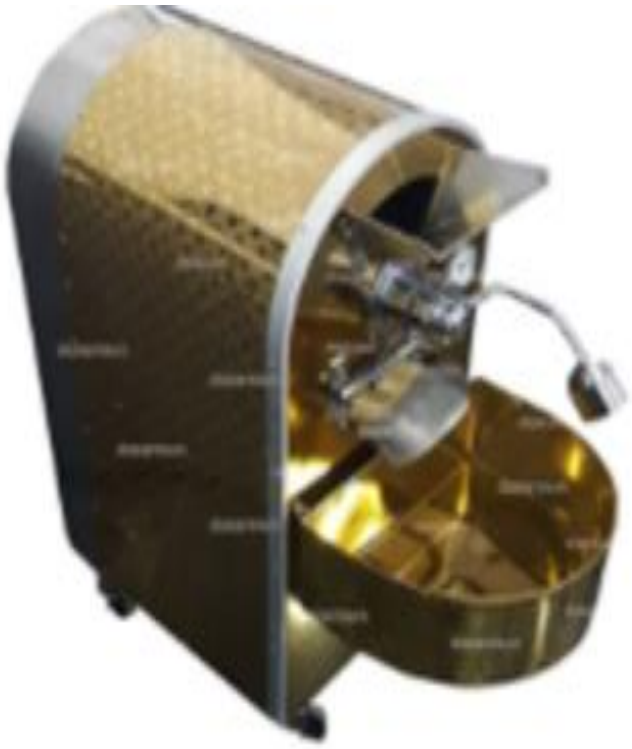

Fig.2 chickpea roasting Machine

B. Sesame roasting machine

Electric heating sesame seeds roasting machine is composed of the transmission part, electric heating pipe, electric control box, roller box, roller and other parts. It uses the temperature controller to automatically control the oven temperature, high degree of automation, low noise, pollution-free, baking roasted peanuts, hazelnuts, cashews, almonds, melon seeds, sesame seeds, rice flour, wheat flour and other granular materials. It is ideal food ideal processing equipment. In addition, it can be customized according to customer needs.

Advantages of Sesame Seeds Roasting Machine:

- The heating method can be customized.
- The baking temperature is uniform.
- Different areas are insulated with minimal heat loss and minimal operating costs.
- Because the machine has an automatic temperature controller, the operating temperature can be well controlled.

- The machine has no residual heat radiation, no dust, no noise, no pollution, and it is easy to implement food hygiene testing standards.
- After baking, the seeds and other materials are full and uniform in color.
- All food contact parts, such as the inner barrel and the upper and lower hoppers, are made of stainless steel. If the whole machine is stainless steel, it can be customized.
- Easy to use, high efficiency, low maintenance.

Fig.3 Sesame roasting machine

C. Continuous Sunflower Seeds Roasting Machine

Continuous Sunflower Seeds Roasting Machine is mainly used for roasting sunflower seeds, pumpkin seeds, peanuts, almonds, cashew nuts, walnuts, pine nuts and other

nuts. It reduces the labor, improves operating efficiency.

Advantages of Continuous Sunflower Seeds Roasting Machine:

- Baking speed automatic frequency control of motor speed control, high efficiency; Double temperature control heating, less energy waste, save energy;
- It has reasonable heat distribution design to make the airflow uniformity, thus ensure the uniform roasting resulting obtainable;
- It has integrated cooling system to prevent the over-roasting and keep the nuts at the optimum condition

Figure.4. Continous sunflower seed roasting machine

Sunflower seeds roaster machine can be customized to be different capacity, the roaster machine can be made to be gas heating and electric heating according to clients requirement.

Sunflower seed roasting equipment includes

- feeding machine,
- roasting machine, and
- Cooling machine.

Feeding Machine: This machine is used to feed raw material roaster machine into next step processing, improves the automation of this whole line.

Sunflower Seeds Roasting Machine: This roasting machine is mainly used for peanuts, beans, melon seeds, nuts, and other granular material drying and baking. By the heat generated by the electric heating pipe, with infrared radiation and hot air convection to drying of material, the baked material taste pure. No spot phenomenon of paste, energy saving, healthy and convenient, easy to operate.

Cooling Machine: This machine is used to cool the temperature of roasted sunflower seeds

2.3 Unit Components of oil seed roasting machine

The roasting oil seed machine unit consists of the following:

- Hopper,
- conveyor trays,
- vibrator motor,
- cabinet (casing)
- lagging materials,
- bearings,
- heating filament,
- frame and exhaust.

2.4 Purpose of confirming materials availability

- To achieve the exact pre-processing goal
- To ensure the performance of materials
- To maintain the materials if it is needed.

Self-Check 2	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (5 points each)

1. Write the unit components of roasting oilseed machine.
2. Write the purpose of confirming material availability for roasting oilseed.

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

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

Information Sheet- 3 Confirm maintenance and roasting requirements

3.1 Introduction

Roasting oil seed equipment/machine maintenance is any process used to keep operations equipment in reliable working order. It may include routine upkeep as well as corrective repair work. The resources needed to keep it all in good repair will vary by type. For instance, repairs made on heavy construction equipment won't look the same as those performed on automated food processing machines.

3.2 Purposes of confirming maintenance requirements

The main objective of confirming equipment maintenance is:

- To avoid machines and equipment breakdown
- Enhancing performance of equipment
- To increase the life cycle of equipment
- To minimize cost.

It includes equipment maintenance by performing several activities such as:

- part replacement,
- repairing and
- Servicing.

So, it ensures that the machine/equipment is operational so that the production activity is not interrupted due to any machine issue.

3.3 Maintenance requirements of roasting oil seed machine

- When capacity of the machine reduces
- When lubrication is needed
- If long term storage is needed
- To take corrective action in response to out-of-specification results
- To locate emergency stop functions on equipment

3.4 Roasting requirements of oilseed

Most kinds of edible vegetable oil in our life are hot pressed, which means roasting the oilseeds before pressing while cold pressing is without roasting. The oil seeds must be evenly roasted. Their water content, temperature and structure should meet the requirement of oil pressing. The effect has a direct influence on the smooth progress of the whole process of edible oil production, the oil yield and the quality of oil as well oil cake by roasting the oil seeds, the oil yield can be largely increased, and the oil yield of hot pressing is twice that of cold pressing

3.5 Maintenance, precautions

Any machine modification may result in bodily injuries to yourself or others.

- Always use original parts and accessories.
- Change damaged parts immediately.
- Replace had worn components in good time.
- Never modify the machine. Modified machines are not covered by warranty or product liability.

Accessory hazards:

- Accidental engagement of accessories during maintenance or installation can cause serious injuries, when the power source is connected.
- Never inspect, clean, install, or remove accessories while the power source is connected.

3.6 Different types of maintenance

Maintenance is a general upkeep and repair of equipment, buildings and grounds, heating and air-conditioning; removing toxic wastes; and perhaps security. Food premises and equipment that are not kept in good repair and condition are a potential source of microbiological and physical contamination of food. Poorly maintained premises and equipment cannot be cleaned effectively. Poor maintenance may allow the entry of other sources of physical, microbiological and chemical contaminants such as water, pests and dust. Poor maintenance can have health and safety implications for workers. Maintenance may include:

- Hand sharpening

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

Basically there are two types of maintenance:-

a. **Preventive or proactive maintenance:** is carried out to keep something functional. This type of activity is usually planned and scheduled.
b. **Corrective or reactive maintenance:** is repairing something to get it working again. This is an unscheduled, unplanned task, usually associated with greater hazards and higher risk levels.

During maintaining the equipment/machine considering the following things are important

- Always disconnect powered tools before servicing, adjusting, oiling, cleaning or repairing them, sharpening or changing accessories such as blades.
- Follow the manufacturer's instructions in user's manual for maintenance and servicing e.g. lubrication, cleaning and changing parts and accessories.
- Use appropriate tools and equipment while carrying out maintenance
- When maintenance is complete workers have to check if the maintenance has left the portable tools in a safe and functioning condition:
- Replace all guards and safety devices
- Record your inspection and actions, sign out and pass the tool to the worker or store it safely

Generally regular maintenance of equipment is an important and necessary activity. The term 'maintenance' covers many activities, including

- inspection
- testing
- measurement
- replacement and
- adjustment and is carried out in all workplaces.

It has a vital role to play in reducing the risk associated with some workplace hazards and providing safer and healthier working conditions. Insufficient and inadequate maintenance can cause serious and potentially deadly accidents or health problems.

Self-Check 3	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (6 points each)

1. Why confirming of maintenance equipment requirements are needed?
2. Write the basic type of maintenance equipment with their definition.

TEST II. Say true or false (2point each)

1. Maintenance is a general upkeep and repair of equipment, buildings and grounds, heating and air-conditioning; removing toxic wastes
2. Maintenance has a vital role to play in reducing the risk associated with some workplace hazards and providing safer and healthier working conditions.
3. Sufficient and adequate maintenance can cause serious and potentially deadly accidents or health problems.

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

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

Information Sheet- 4 Addition of different Ingredients

4.1 Introduction

During industrial processing of oil seeds and nuts to produce edible oils, roasting is often applied before oil extraction. Moreover, oil seeds and nuts are generally consumed as snack food after appropriate roasting. These processes affect both the seeds and their extracted oils in many ways. Beside changes in macronutrients such as protein denaturation/degradation, oil oxidation, sugar pyrolysis and Maillard reactions, minor constituents such as fatty acids, sterols, phenolic compounds and tocols are also affected by roasting. antioxidant capacity of the roasted seeds and oxidative stability of the extracted oil could be greater than that of the unroasted counterpart. These improvements are attributed to the formation of Maillard reaction products, inactivation of oil degrading enzymes and facilitation of phytochemical extraction as a result of roasting.

4.2 Different ingredients used in edible oil industry

In edible oil processing, roasting is important as a pretreatment for various oleaginous seeds destined for oil extraction or to be consumed as snacks. The pretreatment can cause desirable changes in the nutritional and physicochemical characteristics of the seeds and extracted oils. One of the major desired outcomes of the pretreatment process is the increase in antioxidant capacity, mainly because of the formation of maillard reaction products. During roasting, the important precursors to the formation of desirable maillard reaction products are the sugars and free amino acids in oleaginous seeds.

Chemical substances can play an important role in food production and preservation. Food additives can, for example, prolong the shelf life of foods; others, such as colours, can make food more attractive. Flavorings are used to make food tastier. Food supplements are used as sources of nutrition. For instance: Emulsifiers, citric acid, sugar, water. roasting process can leads to changes in proteins, carbohydrates, fats, and vitamins during heat processing. Postharvest operations including dehulling, washing, drying or roasting, packaging, and storage) are important stages to obtain the maximum

yield of good quality. Food processing technologies have been developed for quality improvement, food safety and aesthetics purposes

4.3 Water

Wet raw materials are heated to break the oil/water emulsion and allow the oil to be separated. Groundnuts and sunflower seeds are conditioned by heating with a small amount of water before oil extraction. This assists in rupturing the oil bearing cells and decreases the viscosity of the oil which allows it to flow more freely. The required temperature and moisture content vary according to the raw material. Groundnut flour needs 10% added water and is heated to 90°C in a seed scorcher. Heating is complete when the mixture stops sticking together and forms a free flowing flour.

4.4 Emulsifiers

Citric or lemon juice may be used to increase foam stability. Addition of acid reduces the pH, which reduces the charge on the protein molecules and usually brings them closer to their isoelectric point. This generally results in a stronger, more stable interfacial film Foams make a vital contribution to the volume and texture of many common food products. They give volume and a distinctive mouth feel to products such as whipped cream and ice cream and they give a light, airy texture to baked goods.

2.1 Sugar and salts

Sugar and salts acts as preservative which improve shelf life of an oils.

Self-Check 4	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (3 points each)

1. Chemical substances can play an important role in food production and preservation.
2. During industrial processing of oil seeds and nuts to produce edible oils, roasting is often applied after oil extraction.
3. roasting process can leads to changes in proteins, carbohydrates, fats, and vitamins during heat processing.

Note: **Satisfactory rating – 4.5 points** **Unsatisfactory – below 4.5 points**

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

Information Sheet- 5 Confirming available services

5.1 Introduction

Edible oil processing facilities use energy to heat water and produce steam both for process applications (especially for soap splitting and deodorization), roasting and cleaning processes. Other common energy consumption systems include refrigeration, power and compressed air.

5.2 Electric Power

Edible oil processing industries are large energy consumers, making use of auxiliary boilers for the generation of steam energy. Emissions related to the operation of these steam energy sources typically consist of combustion by-products. Recommended management strategies include adoption of a combined strategy, which involves a reduction in energy demand, use of cleaner fuels, and the application of emissions controls, where required. Recommendations on energy efficiency should addressed in the General environmental health and safety Guidelines. Guidance for the management of small combustion source emissions with a capacity of up to 50 megawatt thermal, including exhaust emission guidelines should be provided in the General environmental health and safety Guidelines.

5.3 Compressor and instrumentation air

A compressor is a mechanical device that increases the pressure of a gas by reducing its volume. An air compressor is a specific type of gas compressor. Compressors are similar to pumps: both increase the pressure on a fluid and both can transport the fluid through a pipe. As gases are compressible, the compressor also reduces the volume of a gas. Liquids are relatively incompressible; while some can be compressed, the main action of a pump is to pressurize and transport liquids. Many compressors can be staged, that is, the fluid is compressed several times in steps or stages, to increase discharge pressure. Often, the second stage is physically smaller than the primary stage, to accommodate the already compressed gas. Each stage further compresses the gas and increases pressure. Those that are powered by an electric motor can also be

controlled using a power inverter, however many (hermetic and semi-hermetic) compressors can only work at certain speeds, since they may include built-in oil pumps. The oil pumps are connected to the same shaft that drives the compressor and forces oil into the compressor and motor bearings. At low speeds, insufficient quantities or no oil is forced into the bearings, eventually leading to bearing failure, while at high speeds, excessive amounts of oil may be lost from the bearings and compressor and potentially into the discharge line due to splashing.

5.4 Energy Consumption and management

In addition to the energy conservation recommendations provided in the General environmental health and safety Guidelines, edible oil processing industry recommendations include the following:

- Improve uniformity of feed to stabilize and reduce energy requirements.
- Increase efficiency of air removal in sterilization vessels to improve heat transfer.
- Identify and implement opportunities for process heat exchange; e.g., optimized oil-oil heat exchangers in continuous deodorization.
- Reduce stripping steam consumption by improving process efficiency; e.g., improve stripping tray design. Where possible, consider technologies such as dry ice condensing systems that may lower energy consumption.
- Consider co-generation combined heat and power to improve energy efficiency.
- Consider more advanced approaches such as the use of enzymes for processes such as degumming and oil recovery.
- Where feasible, use anaerobic digestion for wastewater treatment and capture methane for heat and / or power production

Self-Check 5	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (2 points each)

1. Edible oil processing facilities use energy to heat water and produce steam both for process applications
2. A compressor is a mechanical device that increases the pressure of a gas by reducing its volume.

Note: **Satisfactory rating – 2 points** **Unsatisfactory – below 2 points**

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

Information Sheet- 6 Fitting and adjusting machine components

6.1 Introduction

Fitting is making correct and proper the machine components for the pre-processing of roasting oil seed and pulse. Adjusting is preparing and checking the cleanliness and operation of oilseed roasting machines, equipment and containers.

6.2 Purpose of fitting and adjusting machine components

- To make full function
- status and purpose of guards,
- equipment operating capacities and
- applications, and the purpose and location of sensors and related feedback instrumentation

6.3 Fitting and adjusting of oil seed roasting machine

Oil Seeds Roasting Machine (Roaster) are intended for operation inside roofed industrial premises; they are an integral part of pressing plants equipment producing vegetable oils. Oil Seeds Roasting Machines (Roasters) are vertical columns consisting of one or several sections (pans), which walls are heated with vapour. For mixing and moving of the processed raw stuff the unit is equipped with blade mixers rotated by the joint shaft. To control the level of the crushed seeds in pans under continuous operation, Oil Seeds Roasting Machine (Roaster) is equipped with control valves. On request the temperature of discharged crushed seeds can be adjusted both manually and by means of the automatic control system. To remove gaseous products releasing in operation, the pans are equipped with aspiration fittings joined in the common pipe (air pipe). Depending on the consumer's demands there are many Oil Seeds Roasting Machine (Roaster) of various types and design. Various assembling of Oil Seeds Roasting Machine (Roaster) is possible with steam communication or without it as well as spare parts.

6.4 Important things needed during fitting and adjusting machine and equipment

There are many important things are there which may request during fitting and adjusting of machine and equipment:

The health and safety requirements, and safe working practices and procedures required for the machining, fitting and assembly activities undertaken such as wearing appropriate protective clothing and equipment using machine guards, and of keeping the work area safe and the hazards associated with the activities such as use of power tools, trailing leads or hoses, damaged or badly maintained tools and equipment, using files with damaged or poor fitting handles, using machine tools and how they can be minimized.

Self-Check 6	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (4 points each)

1. Why fitting and adjustment of machine/equipment is needed?
2. What does fitting equipment mean?
3. What does adjusting equipment mean?

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

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

Information Sheet- 7 Operation of equipment Parameters

7.1 Pre requisite Condition during operating equipment

- Check the machine is safe or not before running the machine.
- Start the machine for five to ten minutes to see if there are abnormal phenomena. If the machine is normal, you can start roasting your oil bearing materials.
- In the roasting oil seed process, other people can't approach the machine except the operator.
- Don't touch the roasting machine body or the driving device when it runs.
- The roasting time is determined by the raw materials, usually 15 to 30 minutes.
- After finishing roasting the raw materials, you can start the inversion switch; after all the raw materials delivering out, turn off the power.

7.2 Oil Seed Roaster equipment Working Principle

The closed rotary roaster is an important auxiliary device in oil pressing. It makes use of the vapour created by the oil seeds to evaporate and cook the seeds, so that soften the plant cellulose and prevent the oil seeds from carbonization caused by high temperature. This process will reduce the amount of residue and improve the oil output. During cooking, the machine can control the same oil seeds, and people will not worry about over-cooking.

7.3 Oil Seed Roaster Application

It is suitable for small and medium-size oil plants. It is widely used not only in pre-processing oil seeds but also roasting many kinds of snack food. Equipped with advanced rotary drum structure and carbon steel material, the machine works in a totally closed environment and produces sanitary oil seeds. The rotating design of drum to help the oil crop being heat uniformly and temperature can be controlled easily, which saving energy and save time. Smoke collector working with the air heating system adopts water-recycled wet-type collecting method, and ensures the exhausted gas to satisfy the environmental protection requirement as well as the lowest water consumption. During working procedure, the temperature is adjustable depending on different oil

requirements. It is motive power is optional to electricity, diesel, coal, etc. Air heating system is able to allow highly efficient removal of water from fresh harvested forage.

For different equipment of oilseed roasting equipment the following are some of the parameters which should be considered during operation.

- Capacity
- Power
- Voltage
- Dimension
- Temperature

Self-Check 7	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (6 points each)

1. Write some of the parameters of equipment which are considered during operation.
2. Write some of the prerequisite condition during operating equipment.

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

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

Information Sheet- 8 Performing Oil seed roasting equipment

8.1 Introduction

Performance of equipment identifies and measures losses of important aspects of process namely availability, performance and quality rate. This supports the improvement of equipment effectiveness and thereby it's productivity. In industry, heating of oilseeds is carried out with the aim of increasing oil extraction yield, reducing seed moisture, and deactivating lipases and lipoxygenases which could induce fatty acids oxidation. The oxidation could lead to loss of nutritional value and decreased shelf life. The roasting of oilseeds could also improve the stability of vegetable oils by increasing the extraction yield of antioxidant substances. Depending on the nature and variety of oilseeds, roasting may lead to a decrease or an increase in tocopherols level in oil. Since tocopherols are thermo sensitive, their final concentration in the oil will depend essentially on the temperature and the duration of the roasting.

A method for roasting oil seed comprising the steps of:

- heating the oil seed to a temperature of from about 130° C. to about 205° C. in less than about two minutes to produce heated oil seed;
- Maintaining the heated oil seed at a sufficient temperature and for a sufficient period to produce roasted oil seed; and
- Cooling the roasted oil seed.

Roasting is the key unit operation in converting green oil seed into flavorful roasted. It is the roasting process during which complex chemical reactions develop the desired flavor. It also determines the physical changes in the oil seed microstructure. Nothing but the best roasting conditions will unfold the full intrinsic potential of the green oil seed and create delightful flavor sensations in the container. Whether in industrial or small-scale operations, it will always need the skills of an experienced roast master for composing the ultimate blend and optimizing the roasting parameters in the first place to get the best out of the oil seed. This is why roasting remains and art.

Consequences of low performance of oilseed roasting machine

- Breakdown losses categorized as time losses and quantity losses caused by equipment failure or breakdown. For example, a breakdown of oilseed roasting plant motor in oil industry leads to downtime and thus production loss.

- Set-up and adjustment losses occur when production is changing over from requirement of one item to another. In oil seed roasting plant, this type of loss is encountered during set-ups between different products, testing during start-ups and fine-tuning of machines and instruments.
- Speed losses Idling and minor stoppage losses occur when production is interrupted by temporary malfunction or when machine is idling. For example dirty photocells on roasting machines cause minor stoppages. Though they are quickly fixed, much capacity is lost due to their frequency.
- Reduced speed losses refer to the difference between equipment design speed and actual operating speed.
- Quality Losses, Quality defects and rework are losses in quality caused by malfunctioning production equipment.
- Reduced yield during start-up are yield losses that occur from machine start-up to stabilization.

Some of ways of minimizing low performance of oil seed roasting machine are:

- Update or Service the equipment
- Giving training to the employer about operation system of oil seed roasting machine
- Understanding how to communicate with and evaluate employees,
- providing regular equipment maintenance,
- increasing incentives to produce and establishing production goals are effective ways to minimize oilseed roasting downtime.

8.2 Structure of oil seed roasting machine

Made up of machine frame, hopper, cylinder, block fire cover, the cooking machine motor drives the gear shaft by the V-belt, the gear on the gear drives the big gear on the cylinder to run; then the cylinder rotates and roasted.

Self-Check 8	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (3 points each)

1. Identifying Performance of equipment improves the effectiveness of equipment

2. Roasting is the key unit operation in converting green oil seed into flavorful roasted.
3. During roasting oil seed, maintain the heated oil seed at a sufficient temperature and for a sufficient period to produce roasted oil seed

Note: **Satisfactory rating – 4.5 points** **Unsatisfactory – below 4.5 points**

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

Information Sheet- 9 Carrying out pre- start checks

9.1 Introduction

Pre start checks are the process of monitoring and adjusting equipment to achieve required quality outcomes and take corrective action in response to typical faults and inconsistencies. Pre-operational checks of equipment prior to every use will reduce the chance of equipment being operated in an unsafe condition. This makes it easier to spot and deal with maintenance issues early before they turn into a problem causing downtime, equipment damage or expensive repairs. Unsafe equipment can also cause injury to the operator or other workers and damage to facilities or product.

9.2 Pre start checks of equipment

- Pre-start and safety checks including the service and maintenance system.
- Checking type of oil seed roasting machine with respective oil seed type, fuel, and lubricants needed, fan belts, lines, connections and transmission.
- Inspection of safety guards
- Checking and confirming equipment calibration settings and operating methods
- Observing and monitoring noise levels for correct operation.
- Preparation of independently powered tools may include cleaning, priming, tightening, basic repairs and adjustments.
- Identify and segregate unsafe or faulty equipment for repair or replacement.

9.3 Purpose of pre-start checks

- To make the process easy
- To reduce hazards
- To take action

9.4 Safety requirements During pre- start checks of equipment:

To reduce the risk of serious injury or death to yourself or others, read and understand the Safety and operating instruction before:

- installing,
- operating,
- repairing,
- Maintaining, or changing accessories on the machine.

Post this Safety and operating instruction at work locations, provide copies to employees, and make sure that everyone reads the Safety and operating instruction before operating or servicing the machine. For professional use only, the operator or the operator's employer must assess the specific risks that may be present as a result of each use of the machine.

9.5 The safety signal words in industry

Danger, Warning and Caution have the following meanings:

DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

9.6 Personal protective equipment needed during operating equipment

Always use approved protective equipment. Operators and all other persons in the working area must wear protective equipment, including at a minimum:

- Protective helmet
- Hearing protection
- Impact resistant eye protection with side protection
- Respiratory protection when appropriate
- Protective gloves
- Proper protective boots
- Appropriate work overall or similar clothing (not loose-fitting) that covers your arms and legs.

Self-Check 9	**Written test**

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (4 points each)

1. Write at least three, personal protective equipment needed during operating equipment.
2. Write some safety signal words used in industry
3. Write the purpose of pre start check of equipment.

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

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

Operation sheet-1 Conduct pre start check of roasting oilseed machine

Procedures:

1 Wear appropriate PPE (personal protective equipment)

2 Pre-start and safety checks including the service and maintenance system.

3 Check type machine with respective oil seed type, size (Capacity) of hopper, capacityfuel, and lubricants needed, fan belts, lines, connections, vibrators and transmission.

4 Inspect safety guards

5 Check and confirm equipment calibration settings and operating methods

6 Observe and monitor noise levels for correct operation.

7 Identify and segregate unsafe or faulty equipment for repair or replacement.

8 If needed apply replacement for faulty equipment, Cleaning, priming, tightening, basic repairs and adjustments.

9 Record and report all activities to the concerned personnel

LAP TEST: Performance Test

Name_____ ID_____

Time started: _____ Time finished: _____

Instructions: Given necessary equipment and materials you are required to perform the following tasks within 2 hour. The activity is expected from each student to do it.

LG #33	LO #2 Operate and monitor the oil seed roasting process

Task-1 Perform pre start check of roasting oilseed machine

Instruction sheet

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

- Company Policies and Procedures
- Identifying Operation of equipment and processes
- Monitoring Oil seed roasting process
- Reporting Work place information
- Monitoring Oil seed Specifications Process
- Maintaining housekeeping Standards
- Environmental policy guidelines
- Legislative requirements

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

- Company Policies and Procedures
- Identify Operation of equipment and processes
- Monitor Oil seed roasting process
- Report Work place information
- Monitor Oil seed Specifications Process
- Maintain housekeeping Standards
- Environmental policy guidelines
- Legislative requirement

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 Company Policies and Procedures

1.1. Introduction

Company policies are designed as guidelines for employee behavior, criteria for performance evaluations and ways to make the company more productive. A variety of policies for the company will be included in the employee manual. A policy is a set of general guidelines that outline the organization's plan for tackling an issue. Policies communicate the connection between the organization's vision and values and its day-to-day operations. A procedure explains a specific action plan for carrying out a policy. Procedures tells employees how to deal with a situation and when. Using policies and procedures together gives employees a well-rounded view of their workplace. They know the type of culture that the organization is striving for, what behavior is expected of them and how to achieve both of these.

1.2. Purpose of workplace policies and procedures

Understanding how policies affect employee behavior and production will help to decide which to include in the company guidelines. Moreover, the purposes of knowing the company policies and procedures by employ increases productivity and improve process efficiency of industry. Policies and procedures are helpful for making your workplace run more efficiently, but they are only effective if you enforce them. Enforcement of the guidelines guarantees your organization's operational procedures and decision-making processes are uniform and consistent across cases. When you don't enforce your procedures, you put your organization at risk. If an employee or external person comes forward with an allegation against your company, having formal policies and procedures in place strengthens your case.

1.3. Starting workplace policies and procedures in the Workplace

When creating a policy or procedure for the workplace, start by reviewing the mission statement, vision and values. A workplace policy should:

- set out the aim of the policy
- explain why the policy was developed
- list who the policy applies to
- set out what is acceptable or unacceptable behavior

- set out the consequences of not complying with the policy
- Provide a date when the policy was developed or updated.

To implement effective policies and procedures at your workplace, follow these steps to get the best results.

- Consultation
- Tailor the policy to your business
- Define obligations clearly be specific!

Generally A policy is a deliberate system of principles to guide decisions and achieve rational outcomes. A policy is a statement of intent, and is implemented as a procedure or protocol. Policies are generally adopted by a governance body within an organization. Policies can assist in both subjective and objective decision making. Policies to assist in subjective decision making usually assist senior management with decisions that must be based on the relative merits of a number of factors, and as a result are often hard to test objectively, e.g. work-life balance policy. In contrast policies to assist in objective decision making are usually operational in nature and can be objectively tested.

Self-Check 1	**Written test**

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (3 points each)

1. Company policies are designed as guidelines for employee behavior, criteria for performance evaluations and ways to make the company more productive.
2. The purposes of knowing the company policies and procedures by employ increases productivity and improve process efficiency of industry.

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

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

Information Sheet-2 Identifying Operation of equipment and processes

2.1 Introduction

In order to start the operation of processing of roasting, the operator should monitor the condition of equipment. The adjustment of the equipment before starting the roasting process will have an effect on the quality of the outcome /final product.

2.2 Basic operating principles of equipment operation

Monitoring equipment in operating condition used to secure the equipment working capacity and to increase their efficiency. The following things are taken into consideration in the processes of identifying equipment in operating conditions.

- Main equipment components
- Status and purpose of guards
- Equipment operating capacities and applications
- The purpose and location of sensors
- Related feedback instrumentation

2.3 Materials required for identifying equipment in operating conditions

- Checklists and formats
- Profession Team group
- Procedures and policies of the company
- Workplace procedure and policies
- Material list required to the process

Self-Check 2	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (5 points each)

1. Write some things which may be used during identifying equipment in operation and process.
2. Write materials required for identifying equipment in operating conditions.

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

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

Information Sheet-3 Monitoring Oil seed roasting process

3.1 Introduction

Monitoring the process means the continuous activities to be done from the pre-processing to final point of the processes in industry. Monitoring at this stage focused only the pre-processing activities. Monitoring the process will involve the use of production data such as performance control charts. The control chart is a graphical description method provides a picture of the history of the performance of the process.

3.2 Techniques used to monitor the process are:-

- Inspecting
- checking
- measuring
- testing as required by the process

Inspection or test points (control points) in the process and the related procedures and recording requirements should be recorded to make an adjustment the overall operation. For instance: Raw and roasted sesame are differing significantly in color. Roasted sesame has a darker color with more yellow and red than raw sesame. These changes in color are indicative of chemical browning reactions during roasting. Color is an important consideration in food products as the color and appearance of foods are generally the first impressions consumers have of a specific product. The darker color of roasted sesame is generally preferable to that of raw sesame.

3.3 Monitoring of different oilseed roasting process

Oilseeds are cooked or tempered to denature proteins, release oil from the cells and inactivate enzymes. For example, rapeseed contains the enzyme myrosinase. This enzyme catalyzes hydrolysis of glucosinolates which are naturally present in rapeseed. During the hydrolysis process, undesirable compounds such as isothiocyanates and nitriles form. These compounds are soluble in oil and lower the quality of oil. Rapeseed is cooked in multistage cookers to keep the glucosinolates intact and inactivate the myrosinase. Rapeseed is preheated to 68-122 degrees Fahrenheit in less than 5 minutes and contacted with live steam at 248 degrees Fahrenheit. Since canola has much lower levels of glucosinolates than that of conventional rapeseed varieties the cooking temperature for canola is lower (less than 212 degrees Fahrenheit). Cooked seeds are

immediately pressed to separate oil. Cooking also gives seeds proper elasticity for efficient pressing. Cooking at high temperature is not necessary for sunflower seeds. Cracked and dehulled soybeans are conditioned /tempered by increasing the temperature to 149 degrees Fahrenheit and adjusting the moisture by using live steam. Conditioning is done in rotating drums with an internal steam coil. Tempering improves flaking performance and extraction efficiency.

During the roasting process, the water changes from a liquid into vapor inside the raw material. The raw materials expands, likely the result of the steam generated from the water vapor that then pushes on the compact structure of the raw materials. Because the majority of the starch granules do not gelatinize during roasting, researchers consider the amount of water as a major factor in swelling and gelatinization

Self-Check 3	**Written test**

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (5 points each)

1 What does monitoring the process mean?

2 Write the techniques used to monitor the process in industry.

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

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

Information Sheet-4 Reporting Work place information

4.1 Introduction

A good reporting system should include several elements in order for it to work and for the proper action to be taken in response. The information contained in the reports is

essential to maintain successful safety programs. It is important for work-related incidents to be reported so that they can be tracked and investigated. Once investigated, preventative measures can be implemented. The facts are necessary to develop procedures that can control both the conditions and acts that contribute to incidents. Report any work related injury or illness to the supervisor as soon as possible.

4.2 Reporting occupational Hazard Assessment in edible oil industry

Work is essential for life, development and personal fulfillment. Unfortunately, work activities such as food production, extraction of raw materials, manufacturing of goods, energy production etc. involve processes, operations and materials which can cause hazards which affect the health of workers.

Workplace hazards may be:

- biological,
- chemical,
- physical and
- Psychosocial in nature.

These hazards have resulted in a host of health impacts, ranging from catastrophic direct effects to chronic effects. While the identification of workplace hazards has often come from observations of adverse health outcomes among workers, unquestionably it is in the workplace that the impact of industrial exposures is best understood.

Self-Check 4	**Written test**

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (4 points each)

1. A good reporting system needs in order for it to work and for the proper action to be taken in response.
2. The identification of workplace hazards has often come from observations of adverse health outcomes among workers.

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

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

Information Sheet-5 Monitoring Oil seed Specifications Process

5.1 Introduction

Almost all the oilseeds yield oil more readily if cooked adequately prior to their mechanical expression and/or solvent extraction. The cooking process coagulates the proteins present in the seed causing coalescence of oil droplets and making the seed

permeable to the flow of oil. The process also decreases the affinity of oil for the solid surfaces of seed because of which the best possible yields of oil are obtained on expression/extraction of cooked seed. The cooking process also helps in imparting proper plasticity to seed mass. It insolobizes phosphtides related substances to reduce refining losses of oil. The cooking process destroys the moulds and bacteria to improve the micro-biological as well as quality of oil cake.

5.2 Monitoring roasting process

Further the roasting oil seed process destroys the heat labile ant nutritional factors to improve the nutritive value of protein rich oilseed meals. Heat supplements the work of water in cooking the meal and also in coagulating the albumiroids. On one hand, it weakens the cell walls by cooking and on the other causes volumetric expansion of the droplets which result in the rupture of cell walls and expulsion of oil.

The cooking temperatures and its duration periods for durations of working for most oilseeds range between 105^{o}c-130^{o}c and 30-120 minutes respectively. Optimum conditions for cooking of an oilseed depend on several factors viz. initial moisture content, chemical and bio-chemical characteristics, cooking methods, equipment used, and method of oil extraction.

Certain amount of moisture is essential in oilseeds (between 9-14.5%) to achieve the desirable heat effects on their cooking. Very dry oilseeds cannot be efficiently heat treated without addition of some moisture. On the other hand, the oilseeds containing over 15% moisture require adequate drying during as well as after cooking to achieve efficient crushing. Optimal levels of moisture in most of the cooked oilseeds for hydraulic and expeller pressing is reported to be respectively 5-6 and 2-3%.

Normal cooking of oilseeds has little effect on oil colour; rather it reduces impurities in oil and improves processing quality of oil and nutritive values of cakes. However, over cooking of oilseeds produces oil and cake of dark colour. Oil thus obtained is difficult to bleach and has low nutritive value. The moisture content of cooked oilseeds is critically

important in efficiency of their oil expression/extraction process. If the moisture content is more than the optimal, it results in slippage of the material in the expeller. If such oilseed is solvent extracted, the excessive moisture prevents the proper diffusion of the solvent into the oilseeds as well as creates non-percolation problems.

Figure.1 roasted sesame oil seed

Self-Check 5	**Written test**

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (4 points each)

1 Monitoring oil seed roasting process can regulate the proteins present in the seed.

2 Overheating of oilseeds may produce oil and cake of dark colour.

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

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

Information Sheet-6 Maintaining housekeeping Standard

6.1 Introduction

Good housekeeping reduces illnesses and injuries and promotes positive behaviors, habits, and attitudes. Employers are responsible for assessing each workplace before work begins to identify the potential hazards present, and determine ways to eliminate the hazards. An effective housekeeping program is an important element in workplace safety and health management systems. To avoid these hazards, a workplace must maintain order throughout a workday.

6.2 Maintaining the work area in housekeeping standards

Proper housekeeping management provides for an orderly arrangement of operations, tools, equipment, storage facilities, supplies, and waste material. Good housekeeping is evidenced by floors free from grease and oil spillage; properly identified passageways; unobstructed accesses and exits; neat and orderly machinery and equipment; well-nested hoses and cords; properly stored materials; removal of excess waste material or debris from the working area; walkways free from ice and snow; surfaces, including elevated locations, free from accumulated dust; and adequate lighting. Maintaining these conditions contributes significantly to lower incident rates.

For example, consider the following consequences that can result from poor housekeeping:

- A trip or fall over lines and leads in walkways and work areas
- A slip or fall on an oily or slippery facility floor, vessel deck or other working surface
- A trip or fall from a dock or vessel
- An allergic reaction to a spilled chemical
- An eye injury from falling grit left in the overhead of a work site
- A fire as a result of oily rags left in an area where hot work is performed, or due to the accumulation of combustible dust
- Illness due to the unsanitary conditions of restrooms
- Electrical shock as a result of poorly maintained equipment or energy sources, such as broken, cracked or damaged insulation and connections of wiring
- Lacerations and amputations when poor maintenance results in inadequate lighting
- Exposure to hazardous substances from poor storage and ineffective labeling of hazardous chemicals
- Slip hazards where snow, ice, or standing-water is left on walkways

In shipyard employment, trip hazards and slippery walking surfaces are two of the most hazardous housekeeping issues. In many of these instances, injury could have been

prevented had the employer ensured cleanup prior to the start of work, or required more effective storage of materials, rerouting of hoses and cords, and inspection procedures. Every effort should be made to run air, gas, and electrical lines overhead or underneath walkways. Frequent inspections and assessment of walkways and working surfaces should be conducted to address hazards before they become a danger to workers. Spilled materials, such as oil, grease, and water, must be immediately cleaned from walkways and working surfaces to eliminate slip hazards.

Even with a dedicated effort to keeping work areas clean, ship construction and repair requires that work be performed in tight and congested areas. A key to protecting workers from such obstacles and preventing injury is early detection and immediate action. Employers can keep workers safe by training all workers to:

- Take time to stack materials, boxes and packages properly.
- Clean up masses. Never let safety be someone else's job.
- Remove, repair, and/or report housekeeping hazards.
- Never jeopardize someone else's health and safety by obstructing the access to exits, electrical panels, or fire extinguishers.
- Avoid stringing cords, hoses or lines across walkways. Use "S" and "J" hooks and cable trees to keep lines out of walkways. If lines must cross walkways, cover the lines. Employers must:
- Establish and maintain good housekeeping practices.
- Eliminate slippery conditions, such as snow, ice, and grease, from walkways and working surfaces as necessary. Where removal is not possible, access to such areas must be restricted and an alternate route established, or slip-resistant footwear provided.
- Store materials in a way that does not create hazards for workers.
- Ensure easy and open access to all exits (including ladders, staircases, scaffolds, and gangways), fire-alarm boxes, fire extinguishing equipment and fire call stations.
- Dispose of oils, paint thinners, solvents, rags, scraps, waste, or other flammable and combustible substances, or store them in covered fire-resistant containers, at the end of each work shift or when the job is complete, whichever occurs first.

- Maintain walkways so that they provide adequate passage and are:
  - ✓ Free from debris, including solid and liquid waste;
  - ✓ Clear of tools, materials, equipment, and other objects; and
  - ✓ Free from trip hazards as a result of the improper storage or placement of hoses and electrical service cords. Hoses and cords must be placed above or underneath walkways or covered.

6.3 Importance of good housekeeping practices

Effective housekeeping results in:

- reduced handling to ease the flow of materials
- fewer tripping and slipping incidents in clutter-free and spill-free work areas
- decreased fire hazards
- lower worker exposures to hazardous products (e.g. dusts, vapours)
- better control of tools and materials, including inventory and supplies
- more efficient equipment cleanup and maintenance
- better hygienic conditions leading to improved health
- more effective use of space
- reduced property damage by improving preventive maintenance
- less janitorial work
- improved morale
- improved productivity (tools and materials will be easy to find)

Figure1. cleaning workplace area

6.4 Apply food safety procedures to work practices

Cleaning and Sanitizing Program, Since cleaning and sanitizing may be the most important aspects of a sanitation program, sufficient time should be given to outline proper procedures and parameters. Detailed procedures must be developed for all food-product contact surfaces (equipment, utensils, etc.) as well as for non-product surfaces such as non-product portions of equipment, overhead structures, shields, walls, ceilings, lighting devices, refrigeration units and heating, ventilation and air conditioning systems, and anything else which could impact food safety.

Cleaning frequency must be clearly defined for each process line (i.e., daily, after production runs, or more often if necessary). The type of cleaning required must also be identified. The objective of cleaning and sanitizing food contact surfaces is to remove food (nutrients) that bacteria need to grow, and to kill those bacteria that are present. It is important that the clean, sanitized equipment and surfaces drain dry and are stored dry so as to prevent bacteria growth. Necessary equipment (brushes, etc.) must also be clean and stored in a clean, sanitary manner. Cleaning and sanitizing procedures must

be evaluated for adequacy through evaluation and inspection procedures. Adherence to prescribed written procedures (inspection, swab testing, direct observation of personnel) should be continuously monitored, and records maintained to evaluate long-term compliance.

The correct order of events for cleaning/sanitizing of food product contact surfaces is as follows:

- Rinse
- Clean
- Rinse
- Sanitize

Self-Check 6	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (4 points each)

1. Proper housekeeping management provides for an orderly arrangement of operations, tools, equipment, storage facilities, supplies, and waste material.

2. Good housekeeping reduces illnesses and injuries and promotes positive behaviors, habits, and attitudes.

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

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

Information Sheet-7 Environmental policy guidelines

7.1 Introduction

Roasting of oilseed and pulse has the potential health effects. This may have a serious health impact for those working in commercial edible oil production. Exposure to oilseed dust has been associated with respiratory symptoms such as asthma.

7.2 Work place environmental guidelines

Checking of work environment guidelines should include

- Ventilations
- Lighting
- Noise
- Heat

Lighting: - Make sure that your eyes have time to adapt to changes in lighting level as you move from one area to another. We cannot see properly when we first move from a brightly illuminated area to a darker area. The eyes need a few minutes to adjust to the dark area.

Noise: - The best method of protection is to use quieter equipment, enclosures, and noise reducing materials. Using hearing protection is recommended as required. Need to keep mixer, blender and trolleys in good running condition.

Ventilation: - From the worker should expect to report to his/her supervisor if any occurrence which related to ventilations such as Odors, Dusts, Gases, Vapors, Fumes and Smoke. And ensure that ventilation system conforms to the National Building Code and the Local Fire and Public Health Regulations.

Heat: - the most serious illness is heat stroke, which may be fatal. Heat stroke occurs as a result of working in very hot environments. The symptoms include poor coordination and abnormal behavior which the person may not be aware of, hot and dry skin, and loss of consciousness.

7.3 Environmental issue and recommended techniques of minimizing relating to operational phase of edible oil production

Environmental issues associated with the operational phase of edible oil processing primarily include the following:

- Solid waste and by-products
- Water consumption and management
- Energy consumption and management
- Atmospheric emissions
- Greenhouse gas emissions
- Hazardous materials

Recommended techniques for minimizing the volume of solid waste and by-products for disposal of edible oil processing industry include the following:

- Reduce product losses through better production/storage control (e.g., monitor and adjust air humidity to prevent product losses caused by the formation of molds on edible materials).
- Collect residues from the raw material preparation phase for conditioning (drying) and reprocessing (grinding) to yield by-products (e.g., animal feed).
- Return waste and residues to fields to assist in soil nutrient management; for example, Oil palm plantations with tree trimmings are a valuable soil amendment and/or can be composted with edible oil wastewater effluent.
- Use waste and residues for energy generation in the project plant's boiler(s). Note, however, that relatively high atmospheric emissions (such as particulate emissions) are possible when burning crop residues, and potential fire risks (e.g., from combustible dust) may arise from handling, storing, and processing crop residues; as such, expert advice on fuel characteristics and boiler design should be solicited when planning to use biofuels in this manner.
- Investigate the following options for the responsible disposal of spent bleaching earth:
    - ✓ Use as fertilizer, if not contaminated with heavy metals such as nickel, pesticide residues, or other contaminants.

- ✓ Recover non-food-grade oils from spent bleaching earth that could be used in other applications (feedstock for conversion to biodiesel or in bio-lubricants).
- ✓ Avoid direct recycling on agricultural land. Add spent earth to other organic waste and compost to avoid contact with air and risk of spontaneous combustion of spent bleaching earth.
- ✓ If contaminated, manage according to the waste management guidance

7.4 Personal Protective Equipment

- Clothing/Overall
- Aprons
- Footwear
- Hand Protection
- Eye Protection
- Respiration

Self-Check 7	**Written test**

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. write short answer/s (5 points each)

1. Write at least three environmental issues associated with the operational phase of edible oil processing.
2. Write ways of minimizing the volume of solid and by product of edible oil processing industry.

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

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

Information Sheet-8 Legislative requirements

8.1 Introduction

Food safety is the basis of legislative and additional requirements for vegetable oils. Labeling requirements also deserve special attention, especially for exporters of finished products. An important aspect to control food safety hazards is defining critical control points by implementing food management principles. Another important aspect is subjecting food products to official controls.

8.2 Legislative Requirements

A person conducting a business or undertaking at a workplace must ensure so far as is reasonably practicable, the following:

- The layout of the workplace allows and the workplace is maintained so as to allow, for persons to enter and exit and to move about without risk to health and safety, both under normal working conditions and in an emergency,
- Work areas have space for work to be carried out without risk to health and safety,
- Floors and other surfaces are designed, installed and maintained to allow work to be carried out without risk to health and safety,
- Lighting enables:
  - ✓ Each worker to carry out work without risk to health and safety, and
  - ✓ Persons to move within the workplace without risk to health and safety, and
  - ✓ Safe evacuation in an emergency,
- Ventilation enables workers to carry out work without risk to health and safety,
- Workers carrying out work in extremes of heat or cold are able to carry out work without risk to health and safety,
- Work in relation to or near essential services does not give rise to a risk to the health and safety of persons at the workplace.

Ethiopian food standard code

- Mandatory roasting oil seed and edible oil standard
- Mandatory packaging and labeling standard
- weights and measures legislation
- Ethiopian Food and Drug Authority legislation
- legislation of OHS environmental management (Ethiopian Environmental Protection Authority)

8.3 Ethiopian food and Drug authority legislation

The country's food safety regulatory system is authorized and mandated in Parliamentary Proclamation – Ethiopian Food, Medicine and Healthcare Administration and Control Authority Proclamation No. 661/2009. This legislation provided the legal authorities for the government to consolidate the pre-existing food regulatory system with the aim of better 'protecting the public from health risks emerging out of unsafe and poor quality food.' In particular, the Proclamation authorizes the setting of standards and regulations for locally-produced and imported foods, in areas such as production, promotion, storage, packaging and labeling, distribution, and laboratory testing.

In a subsequent Parliamentary Proclamation – Ethiopian Food, Medicine and Healthcare Administration and Control Authority Regulation No. 189/2010 – the Food, Medicine, Healthcare and Control Authority (FMHACA) was established, under the purview of the Ministry of Health, as the competent authority responsible for setting and enforcing food safety standards and regulations. Under this proclamation, food is defined as "any raw, semi-processed or processed substance for commercial purpose or to be served for the public in any way intended for human consumption that includes water and other drinks, chewing gum, supplementary food and any substance which has been used in the manufacture, preparation or treatment of food."

8.4 OHS (Occupational health and safety)

Occupational health and safety performance should be evaluated against internationally published exposure guidelines. The working environment and workers health should be monitored for occupational hazards and diseases relevant to the specific work. Monitoring should be designed and implemented by accredited professionals, as well as applicable prevention or protection measures, as part of an occupational health and safety monitoring and prevention program. Facilities should also maintain a record of occupational accidents, diseases, and dangerous occurrences and other accidents.

Self-Check 8	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (3 points each)

1. Food safety is the basis of legislative and additional requirements for edible oils.
2. The working environment and workers health should be monitored for occupational hazards and diseases relevant to the specific work.

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

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

Operation Sheet 1- under taking oil seed roasting process

Materials required:

Oil seed roasting machine with its unit components

Cleaned soybean

Procedures:

- Wear appropriate personnel protective equipment.
- Check and make available all necessary equipment and the coming raw-materials.
- Adjust, maintain and take corrective action when and where necessary.
- heat the oil seed to a temperature of from about 130° C. to about 205° C. in less than about two minutes to produce heated oil seed;
- Maintain the heated oil seed at a sufficient temperature and for a sufficient period to produce roasted oil seed; and
- Cool the roasted oil seed.
- clean and store the equipment at the end of completion of the work
- Record all activities

LAP TEST: Performance test

Name_____ ID_____

Time started: _____ Time finished: _____

Instructions: Given necessary equipment and materials you are required to perform the following tasks within 2 hour. The activity is expected from each student to do it.

Task-1 Undertake oil seed Roasting process

Operation Sheet.2 Maintaining housekeeping standard

Procedures

1 Select and use personal protective equipment
2 Prepare checklists for keeping records and reporting the observation
3 Select the appropriate cleaning methods: Rinse, Clean, Rinse, Sanitize
4 Select the appropriate sanitation methods and detergents
5 Read the instruction of the manufacturer
6 Select the appropriate detergent or chemicals
7 Sanitize work area
8 Observe the result
9 Take the records and reports to the concerned personnel

LAP Test: Performance test

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **2** hours.

Task.1 Undertake maintaining housekeeping standard

LG#34	LO #3 shut down the oil seed roasting process

Instruction sheet

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

- Identifying shutdown procedure
- Shutting down oil seed roasting process
- Reporting maintenance requirements

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, you will be able to:

- Identify shutdown procedure
- Shutdown oil seed roasting process
- Report maintenance requirements

Learning Instructions:

1 Read the specific objectives of this Learning Guide.

2 Follow the instructions described below.

3 Read the information written in the information Sheets

4 Accomplish the Self-checks

Information Sheet-1 Identifying shutdown procedure

1.1 Introduction

Lock out a machine/equipment usually means the power feeding the machine is disconnected either by pulling a plug, placing a switch in the off position, or turning a circuit breaker to the off position. It might be used to secure the power switch of the machine or it might be used to lock shut the door to a circuit breaker panel where the thrown breaker is located. Shutdown is that state where all rotating equipment, heaters, and other unit operations are stopped. No attempt is made to keep the unit in a partially operating state. However, equipment is not inventoried, nor is anything purged except for the equipment that is being worked on. This type of shutdown is one that affects just a local operating unit. Equipment in that unit should be brought to a safe state, but it will be on standby, i.e., ready for immediate restart once conditions are back to normal. Normally, other units in the facility, including the utilities area, will continue operations at this level of shutdown. However, quick action may be required before the local shutdown leads to a shutdown of the whole process.

1.2 Identifying shutdown procedure

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; cleaning is often a process unto itself requiring its own set of startup, operation and shutdown procedures. Start up and shutdown procedures are clearly highly dangerous. Human error during these processes should therefore be avoided at all cost, as the effects can be truly disastrous. They have also implemented mechanical interlocks on a wide scale. Their procedures leave no room for different interpretations and process interlocking quite often is a formal and mandatory provision to ensure strict adherence to procedures on critical operations, such as start-up and shut-down procedures, relief valve change over and pigging operations. Following the installment of the procedures, the companies established excellent safety records and were able to substantially minimize accidents and spills. For example, if shutting down a piece of

equipment impacts the ability to carry on with the operation, that's a good indication that it's a critical piece of equipment.

The following procedures should be taken into account to identify shutdown procedures.

- Shut down must be conducted using the standard procedures established for the Machine or equipment (not emergency procedures or other shortened/simplified method).
- Pull plug or throw switch to off position before cleaning or adjusting any machine and away from moving parts.

Techniques to identify shutdown procedures:

- Apply Safety first and/or use PPE
- Identify tools and equipment for the processes
- Identify shut down processes from the manual manufacturers
- Observe Lock out/ Tag out procedure
- Check which systems be isolated or shut down
- Identify methods that be used to tie into existing systems
- Ask who the contacts persons on the job site are in case something goes wrong
- Check all switches to see that they are off before plugging into the outlet

Self-Check 1	Written test

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true or false (5 points each)

1. Lock out a machine/equipment usually means the power feeding the machine is disconnected either by pulling a plug or turning a circuit breaker to the off position.
2. Shut down must be conducted using the standard procedures established for the Machine or equipment.

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

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

Information Sheet-2 Shutting down oil seed roasting process

2.1 Introduction

Shut down is a term used to describe the process of closing all systems of process control systems. All employers are obligated to ensure staffs are trained in workplace emergency procedures. This may include what to do in case of a fire, earthquake, or other emergency; identifying locations of emergency exits; and processes to follow to evacuate the building in the case of an emergency. Shut down is a term used to describe the process of closing all systems of process control systems.

2.2 Uses of Shutdown Processes

- Safely shut down of the equipment.
- To locate emergency stop functions on the equipment.

Shut down the process May include:

- Clean and sanitize equipment
- Take samples and conduct test
- Carry out routine maintenance

2.3 Environmental Issues related to Shutting down process

- inclement weather during operations
- machine breakdowns
- power outages
- storm damage to equipment and site

Different shutdowns procedures are appropriate to the process and workplace production requirements, including emergency and routine shutdowns and procedures to follow in the event of a power outage. Isolation, lock out and tag out procedures and responsibilities are appropriate.

2.4 Shutdown the process with workplace procedures

The key point of lockout/tag out procedures is to shut down completely machinery and electrical equipment before repair, maintenance and cleaning. the following are the six-step shutdown procedure:

1. before shutdown. The authorized employee must know the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy. The authorized employee must notify all affected employees of the lockout.

2. Shutdown. The authorized employee shuts down the machine or equipment by the normal stopping procedure, such as pressing the stop button, moving the switch to the “off” position, etc.

3. Isolation. The main power switches, circuits, or additional sources of energy are moved to the “off” position or otherwise made inoperative.

4. Lockout. Locks are placed on switches or other energy sources in the “safe” or “off” position. During a group lockout, all members of the group must add their own locks to the group lockout devices and should never place a lock inside another individual’s lock. Warning tags should be placed with each lock.

5. Energy release. All potentially hazardous stored or residual energy, such as that in springs, elevated parts, rotating flywheels, hydraulic systems, electrical systems, and air, gas, steam, or water pressure, etc., is relieved, disconnected, or otherwise made safe by repositioning, blocking, bleeding down, etc. If there is a possibility of re accumulation of stored energy to a hazardous level, verification of isolation must be continued until the Servicing or maintenance is completed or until the possibility of such accumulation no longer exists.

6. Testing. After making sure that no personnel are exposed, and as a check on having disconnected the energy sources, the authorized employee operates the push button or other normal operating controls to make certain the equipment will not operate.

Self-Check 2	

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Write short answer/s (5 points each)

1. Write activities under taken during shut down process of machine.
2. Write the six-step shutdown procedure of machine.

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

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

Information Sheet-3 Reporting maintenance requirements

3.1 Introduction

Maintenance requirements are the processes of maintaining work area to meet housekeeping standards and Respond to and report equipment failure within level of responsibility. Shutdown Maintenance is maintenance that can only be performed while equipment is not in use. Shutting down machinery can be costly, but sometimes due to the nature of the defective part/machine, shutdown maintenance is the only viable maintenance procedure. Technicians will do all that they can to avoid a complete shutdown. In some industrial applications for example power generation, a shutdown can mean enormous financial losses. Machine maintenance is the work that keeps mechanical assets running with minimal downtime.

Machine/equipment maintenance can include

- regularly scheduled service,
- routine checks, and
- Both scheduled and emergency repairs.
- It also includes replacement or realignment of parts that are worn, damaged, or misaligned.

Machine maintenance can be done either in advance of failure or after failure occurs. Machine maintenance is critical at any plant or facility that uses mechanical assets. It helps organizations meet production schedules, minimize costly downtime, and lower the risk of workplace accidents and injuries

3.2 Machinery and Equipment that Require Maintenance in edible oil industry

Some of the equipment and machines which may be requiring maintenance in edible oil industry are as follows:

- Oil seed roaster
- Oil seed sievers machine /equipment
- Automatic packing machine
- conveyor

- Cleaning machine
- Oil seed treatment plant
- Oil seed dryer etc.…

3.3 Purposes of Maintenance Requirement

Maintenance requirement requires that: all sorting and grinding equipment be maintained in an efficient state, in efficient order and in good repair. Where any machine and equipment has a maintenance log, the log is kept up to date; and that maintenance operations on work equipment can be carried out safely. Maintenance is used to maintain typical equipment faults and related causes, including signs and symptoms of faulty equipment and early warning signs of potential problems.

3.4 Identifying maintenance requirements

Steps should be taken to manage any risks arising from maintenance activity. Manufacturer's instructions should make recommendations on how to safely undertake maintenance of their work equipment and, unless there are good reasons otherwise, these should always be followed. Where possible, equipment should normally be shut down and any residual or stored energy safely released e.g. pneumatic pressure dumped, parts with gravitational or rotational energy stopped or brought to a safe position. For high-risk equipment, positive means of disconnecting the equipment from the energy source may be required e.g. isolation, along with means to prevent inadvertent reconnection e.g. by locking off. Formal systems of work, such as a permit to work, are required in some cases to safely manage high-risk maintenance operations.

In some cases, it may not be possible to avoid particular significant hazards during the maintenance of work equipment so appropriate measures should be taken to protect people and minimize the risk. These may include:

- Physical measures, e.g. providing temporary guarding, slow speed hold to run control devices, safe means of access, personal protective equipment (PDF)-Portable Document Format, etc.
- Management issues, including safe systems of work, supervision, monitoring
- Personnel competence (training, skill, awareness and knowledge of risk)

It is important that these situations are properly assessed. Staff undertaking maintenance may need to undertake significant on-the-job risk assessment (essentially considering what could go wrong and how to avoid injury), as the situation may develop and change in ways that could not be foreseen at the outset. Maintenance work should only be undertaken by those who are competent to do the work, who have been provided with sufficient information, instruction and training . With high-risk or complex equipment, these demands may be significant and, in some cases, may be best undertaken by the manufacturer or specialist contractors. But, in many cases, maintenance can be done in-house by suitably trained, competent staff.

3.5 Reporting maintenance requirements

Keep dated reports of operational tests and the rated load test as long as the device is available for use. Inspection records should be retained in a format and location that provides for ease in accessibility. Maintenance file information should provide a source for comparing present conditions with past conditions to determine whether existing conditions show a trending pattern of wear, deterioration, or other comparable factors that may compromise safe, continued use of the equipment. Length of record retention shall be determined by the equipment custodian's (keeper) established maintenance program.

Shut-down of cereal cleaning machines may include safe dismount procedures including turning off the power, maintaining a clear thoroughfare, identifying the hazards, securing, cleaning, checking and recording.

- The operational records of machines used for roasting oil seed are completed and maintained according to enterprise requirements.
- Report all accidents
- Malfunctions, faults, irregular performance and damage to machines and equipment are detailed and reported according to enterprise requirements.
- At the end, cleaned, secured and stored according to OHS and enterprise requirements.

Examples: for how to fill or document maintenance required and report performed maintenance is given below:

Table 1 Form for maintenance schedule

Date	Tool	Maintenance check points	Signature	Maintenance required	Signature
10/02/2013	Different Screw driver, wrench, bolt, nut, etc…	Vibrators of roasting oil seed machine, hopper, etc…	Mr. y	Cleaning, lubrication etc…	Mr. x

Table 2 Reporting Performed maintenance form

Maintenance Performed	Date	Signature
Cleaning hopper, conveyor trays,	15/02/2013	Mr. x
vibrator motor, cabinet (casing) of oil seed roasting machine,		

Self-Check 3	

Name_____ **ID**_____ **Date**_____

Directions: Answer the questions listed below.

TEST I. Say true for correct statements and false for incorrect (5 points each)

1. The operational records of machines used for roasting oil seed should be maintained according to enterprise requirements.
2. Maintenance requirement requires that all sorting equipment be maintained in an efficient state, in efficient order and in good repair.

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

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

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