Oil Seed and Pulse Processing

Level II

Based on October 2019, Version 2 Occupational standards

Module Title: Operating De-hulling Process

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LG #22	LO 1- Prepare de-hulling 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 material to meet operating requirements.
- Identifying cleaning and maintenance requirements
- Confirming ingredients and services
- Fitting and adjusting machine components
- Operation of equipment and processes
- Checking and adjusting equipment performance
- Carrying out Pre-start checks.

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

- Confirm material to meet operating requirements.
- Identify cleaning and maintenance requirements
- Confirm ingredients and services
- Fit and adjust machine components
- Operation of equipment and processes
- Check and adjust equipment performance
- Carry out Pre-start checks

Learning Instructions:

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

Information Sheet- 1 Confirming material to meet operating requirements

1.1 Introduction

Conformity is the “fulfillment of a requirement”. To conform means to meet or comply to requirements. There are many types of requirements. There are quality requirements, customer requirements, product requirements, management requirements, legal requirements, and so on.

Requirements can be explicitly specified (like the ISO 9001 requirements) or implied. A specified requirement is one that has been stated (in a document, for example). When your organization meets a requirement, you can say that it conforms to that requirement.

1.2 Confirming material to meet operating requirements

Conforming means the material meets the requirements while nonconforming means the material does not meet the requirements.

1.2.1 Confirming material quality requirements

It involves confirming which products and materials comply with the specified quality control requirements after inspection and testing. Identifying which products and materials do not conform to the specified quality control requirements and evaluating what action is required. Materials and products that do not conform to the required quality standards must be dealt with in the appropriate way according to specified quality control requirements. This also involves the reporting of results of the sampling procedure to the appropriate person. The total quality system is the agreed company-wide and plant-wide operations work structure, documented in effective, integrated, technical, and managerial procedures, for guiding the coordinated actions of the work force, the machines, and the information of the company and plant in the best and most practical ways to assure customer quality satisfaction and economical costs of quality.

Self-Check 1	Written Test

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

1. Define conformity (5 point)

2. Write materials conformity requirements (5 point)

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

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

Information Sheet-2 Identifying cleaning and maintenance requirements

2.1 Identifying cleaning and maintenance requirements

Normally, the oil seeds are mixed with a variety of foreign materials sand, stones, stalks, weed seeds, foliage, etc., during harvesting, handling and transportation. It is ideal to clean seed before putting it into store. Stone, iron and wood pieces mixed with seeds can disrupt mechanical equipment during processing. Foreign matters may lower protein content and increase fiber content of meal residue after extraction of the oil. Moreover, foreign matters mixed with oilseeds may be having high moisture content which may initiate overheating in storage. The local hot spots in the oilseed damage the quality and constitute a fire hazard if not properly detected and corrected by aeration or rotation. Also, cleaning before storage of oils not required further cleaning for processing and saves double handling of seeds. In short, proper cleaning of oilseeds can increase in crushing capacity of oil expelling units, reduce in-plant maintenance and improve the quality of oil and cake. Main cleaning equipment's are:

2.1.1 Magnetic separator

Removal of iron from various kinds of raw materials and semi-finished products and collection of iron powder are called magnetic separation. A magnetic separator to select must be suitable for the purpose of use and have a sufficient capacity. To select such a most suitable separator, when inquiring about separators, conditions such as the purpose of use and properties of materials need to be informed, as detailed below:

- Purpose (improving the grade, collecting useful magnetic substances, etc.)
- Kind, composition and components of raw materials
- Grain size of raw materials (□□ mm – □□ mm, □□ mesh – □□ mesh)
- Water content, raw material temperature
- Apparent specific gravity (bulk density)
- Kind, shape and grain size of mixed magnetic substances
- Amount of raw materials to process per hour (kg/h, m3/h)
- Amount and ratio of mixed

Example induction type powerful magnetic separator

These separators are suitable for separation of weak magnetic substances that exist in powder and granular materials of quartz sand (glass material), high grade casting sand and chromite sand. In addition, these separators are used to remove iron ores from such nonferrous minerals as tungsten, manganese ore, titanium ore, monazite, garnet and ilmenite, to remove weak magnetic oxides from casting sand (quartz sand) and to separate weak magnetic substances from other powder and granular materials.

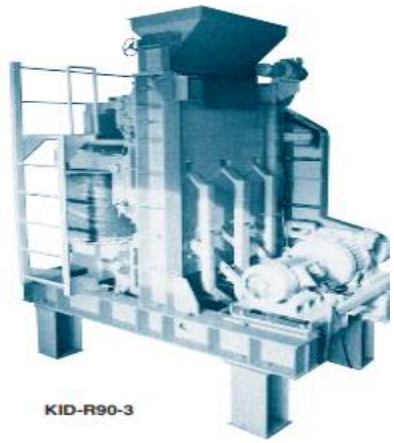

Figure 1 Induction type powerful magnetic separator

2.1.2 De stoner

Separations of admixtures at first stage in cleaning process allows for increased efficiency. Performing foreign material separation early in the cleaning process allows for increased efficiency by downstream processing equipment. When receiving product at beginning of season, unload time is very important.

Self-Check -2	Written Test

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

1. Define cleaning (5 point)

2. Write the different between magnetic separator and de stoner (5 point)

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

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

Information Sheet- 3 Confirming ingredients and services

3.1 Introduction

The manufacturing of oil industry ingredients (ODI) under an appropriate system for managing quality .It is also intended to help ensure that ODI meet the requirements for quality and purity that they purport or are represented to possess. "Manufacturing" is defined to include all operations of receipt of materials, production, packaging, repackaging, labeling, relabeling, quality control, release, storage and distribution of oil industry ingredient and the related controls.

3.2 Confirming ingredients and services

Confirmation that the design and construction, water, utilities, lighting and sanitation and maintenance are in satisfactory condition.

3.2.1 Design and Construction

Buildings and facilities used in the manufacture of intermediates and APIs (oil industry Ingredient) should be located, designed, and constructed to facilitate cleaning, maintenance, and operations as appropriate to the type and stage of manufacture. Facilities should also be designed to minimize potential contamination. Where microbiological specifications have been established for the intermediate, facilities should also be designed to limit exposure to objection able microbiological contaminants as appropriate. Buildings and facilities should have adequate space for the orderly placement of equipment and materials to prevent mix-ups and contamination. Where the equipment itself (e.g., closed or contained systems) provides adequate protection of the material, such equipment can be located outdoors. The flow of materials and personnel through the building or facilities should be designed to prevent mix-ups or contamination. There should be defined areas or other control systems for the following activities:

- Receipt, identification, sampling, and quarantine of incoming materials, pending release or rejection;
- Quarantine before release or rejection of intermediates and APIs;

- Sampling of intermediates and oil industry ingredients;
- Holding rejected materials before further disposition (e.g., return, reprocessing or destruction);
- Storage of released materials;
- Production operations;
- Packaging and labeling operations; and
- Laboratory operations.

Adequate, clean washing and toilet facilities should be provided for personnel. These Washing facilities should be equipped with hot and cold water as appropriate, soap or Detergent, air driers or single service towels. The washing and toilet facilities should be separate from, but easily accessible to, manufacturing areas. Adequate facilities for showering and/or changing clothes should be provided, when appropriate.

Laboratory areas/operations should normally be separated from production areas. Some laboratory areas, in particular those used for in-process controls, can be located in production areas, provided the operations of the production process do not adversely affect the accuracy of the laboratory measurements, and the laboratory and its operations do not adversely affect the production process.

3.2.2 Utilities

All utilities that could impact on product quality (e.g. steam, gases, compressed air, and heating, ventilation and air conditioning) should be qualified and appropriately monitored and action should be taken when limits are exceeded. Drawings for these utility systems should be available. Adequate ventilation, air filtration and exhaust systems should be provided, where appropriate. These systems should be designed and constructed to minimize risks of contamination and cross-contamination and should include equipment for control of air pressure, microorganisms (if appropriate), dust, humidity, and temperature, as appropriate to the stage of manufacture. Particular attention should be given to areas where oil industry is exposed to the environment. If air is recirculated to production areas, appropriate measures should be taken to control risks of contamination and cross-contamination.

Permanently installed pipework should be appropriately identified. This can accomplished by identifying individual lines, documentation, computer control systems, or alternative means. Pipework should be located to avoid risks of contamination of the oil industry. Drains should be of adequate size and should be provided with an air break or a suitable device to prevent back-siphonage, when appropriate.

3.2.3 Water

Water used in the manufacture of oil industry should be demonstrated to be suitable for its intended use. Unless otherwise justified, process water should, at a minimum, meet World Health Organization (WHO) guidelines for drinking (potable) water quality. If drinking (potable) water is insufficient to assure oil industry quality, and tighter chemical and/or microbiological water quality specifications are called for, appropriate specifications for physical/chemical attributes, total microbial counts, objectionable organisms and/or endotoxins should be established. Where water used in the process is treated by the manufacturer to achieve a defined quality, the treatment process should be validated and monitored with appropriate action limits.

Where the manufacturer of a non-sterile oil industry either intends or claims that it is suitable for use in further processing to produce a sterile oil product, water used in the final isolation and purification steps should be monitored and controlled for total microbial counts, objection able organisms, and endotoxins.

Dedicated production areas, which can include facilities, air handling equipment and/or process equipment, should be employed in the production of highly sensitizing materials, such as penicillin's or cephalosporin's. Dedicated production areas should also be considered when material of an infectious nature or high pharmacological activity or toxicity is involved (e.g., certain steroids or cytotoxic anti-cancer agents) unless validated inactivation and/or cleaning procedures are established and maintained.

Appropriate measures should be established and implemented to prevent cross contamination from personnel, materials, etc. moving from one dedicated area to another. Any production activities (including weighing, milling, or packaging) of highly toxic non pharmaceutical materials such as herbicides and pesticides should not be conducted using the buildings and/or equipment being used for the production of oil industry. Handling and storage of these highly toxic non-pharmaceutical materials should be separate from APIs.

3.2.4 Lighting

Adequate lighting should be provided in all areas to facilitate cleaning, maintenance, and proper operations. Sewage and Refuse Sewage, refuse, and other waste (e.g., solids, liquids, or gaseous by-products from manufacturing) in and from buildings and the immediate surrounding area should be disposed of in a safe, timely, and sanitary manner. Containers and/or pipes for waste material should be clearly identified.

3.2.5 Sanitation and Maintenance

Buildings used in the manufacture of intermediates and APIs should be properly maintained and repaired and kept in a clean condition. Written procedures should be established assigning responsibility for sanitation and describing the cleaning schedules, methods, equipment, and materials to be used in cleaning buildings and facilities.

When necessary, written procedures should also be established for the use of suitable rodenticides, insecticides, fungicides, fumigating agents, and cleaning and sanitizing agents to prevent the contamination of equipment, raw materials, packaging/labeling materials, intermediates, and oil industries.

Self-Check -3	Written Test

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

1. Define manufacturing (5 point)
2. What is the purpose of light for industries (5 point?)

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

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

4.1 Introduction

Nowadays the market fluctuation and the fashion ask for more and more new and different patterns, the batch size decreases, it is necessary to design and manufacture with reducing delays best quality products at the lower cost. So the concept of concurrent engineering must be used, it is now well known in industry as well as in academic area. The design of the parts, the process planning, even the production system must be made quite simultaneously**.**

4.2 Fitting and adjusting machine components

Adjusting a machine tool demands to connect the active part of the tool with the machined surface. This work does not succeed at the first time because there are a lot of errors or uncertainties due to the adjustment operation and the machining process as well as the static or dynamic behavior of the machine tool, the tool or the work piece.

Those uncertainties are the causes of manufacturing deviations. To control the influence of some uncertainties as screw, displacement reversibility or slide way defects, machine-tool builder put some adjustment parameters into the numerical control unit or adjustable stops on conventional machine tool. The modification of these parameters allows to moving the uncertainty zone compared with its nominal position. The dimension of this displayed quantity (adjustment parameter) is the length.

In return, the dimension of machined quantity is more complicated, it assures the respect of the functional requirement. So in practice, for adjustment correction, these requirements must be translate into a dimension compatible with a length (dimension of displayed quantity). Therefore, the aim of the measurement task is to evaluate the respect of the function and to give a measured quantity compatible with the adjustment parameters. The difference between displayed quantity and measured quantity gives the value of the correction of the adjustment parameter**.**

Self-Check -4	Written Test

Directions: Say True or False

1. Machine uncertainties are the causes of manufacturing deviations (5 point)
2. The dimension of machined quantity is not more complicated (5 point?)

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

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

Information Sheet- 5 Operation of equipment and processes

5.1 Operation of equipment and processes

- Refer to the fundamental activities of organizations:
  - ✓ What they do and what they deliver
  - ✓ How they produce the goods and services to meet consumers' needs and wants
- Production can take a variety of forms:
  - ✓ Large-scale capital intensive production such as oil refineries or car plants
  - ✓ Small business such as bakery, restaurants schools

5.2 Equipment selection

Dehulling layout and equipment selection go hand in hand, in that the needs of the equipment with respect to the processes, flow direction, ease of operation and maintenance, etc. must be blended into the overall plan, with the ultimate objective of maximizing the productivity of each machine and minimizing handling. On selecting equipment with energy in mind, due consideration should be given to:

- Its relationship to other equipment in the process and to be balanced accordingly;
- Its energy demands per unit of production must be acceptable;
- To be properly sized to meet production demands as well as having adequate capacity to cater for surge requirements, yet not to operate well below its rated capacity;
- To be robust in construction, reliable and permit ease of maintenance so as to ensure a minimum of downtime;
- To incorporate a correctly designed waste disposal system so as to avoid accumulation of residues.

Self-Check -5	Written Test

Directions: Say True or False

1. Operation of equipment refer to the fundamental activities of organizations (5 point)
2. Dehulling layout and equipment selection go hand in hand, in that the needs of the equipment (5 point?)

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

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

Information Sheet- 6 Checking and adjusting equipment performance

6.1 Introduction

Performance (p): Sometimes referred to as Efficiency, is a measure of how good the machine runs while it is running (within the operating time).

Performance = Pieces Produced / (Ideal Speed * Operating Time) * 100%

- Pieces Produced = unplanned scrap PLUS acceptable pieces.
- Ideal Speed = optimal speed the part should run on the machine.
- Operating Time = Planned Production Time - Planned Downtime

6.2 Checking and adjusting equipment performance

a. Laboratory equipment maintenance and intermediate performance checks are conducted on a scheduled basis. A schedule, identifying and eliminating potential sources of problems, is established for the servicing of laboratory equipment.

b. Note: Intervals of intermediate performance checks should be shorter than the time the equipment has been found to take to drift outside acceptable limits.

c. Such maintenance and performance checks are recorded to demonstrate that the program is being followed according to schedule.

d. Manufacturer's instructions are used for guidance in performing equipment maintenance. In the absence of manufacturer's instructions, instructions are provided in the equipment operation procedure.

e. The maintenance and performance checks records may be maintained in a logbook, log sheet, or electronically.

f. Attachment A provides information on minimum maintenance requirements for equipment according to AOAC-International. ORS laboratories are responsible for developing comparable maintenance schedules for equipment not listed in this table.

g. Preventative maintenance procedures, other than basic cleaning, are developed for each equipment item, unless they are already described elsewhere (e.g. the instrument manual).

h. General Service equipment is typically maintained only with cleaning and safety checks.

i. Use of outside contractors to perform repairs or maintenance is at the discretion of local laboratory management.

6.3 Overall Equipment Effectiveness

OEE is a measurement used in programs. The measure includes machine effectiveness and efficiency and is a metric commonly found in. It helps answer three questions:

- How often is the machine available to run?
- How fast does it run when it's running?
- How many acceptable parts were produced?

6.4 Big Losses

These six areas of losses impact OEE and its three components. Breaking down the losses to these categories helps the Six Sigma team prioritizes improvements. The losses affect one of the three products (A, P, or Q) and the area with the lowest percentage is likely a good place for the team to focus its improvements.

6.5 Breakdown Losses

Sudden or unexpected equipment failures that make the machine less available. Contributing factors include:

- Major mechanical failures
- Electrical system failures
- Structural failure

6.6 Set-up & Adjustment Losses

Downtime and defective product that occurs when production of one part stops and the equipment is set-up/adjusted to meet the requirements of another part. The degree of loss depends on factors such as:

- Process standards
- Maintenance level of equipment
- Tooling consistency and quality
- Operator skill level

- Machine to machine standardization

6.7 Idling & Minor Stoppages

Production is interrupted by a temporary malfunction or when the machine is idling. Contributing factors include:

- Defective products that result in line shut line down
- Disruption of production flow, lack of product or raw material, tools
- Dependence on assembly components or other inputs
- Operator on other machine or other tasks
- Temporary equipment malfunction

6.8 Start Up Losses

This type of loss is a yield loss that occurs during the early stages of production - from machine start-up, warm-up, "learning phase" to the point where the machine is producing regular, quality production. The degree of loss depends on factors such as:

- Maintenance of equipment
- Tooling
- Raw Material
- Operator skill level

6.9 Reduced Speed Losses

Reduced speed loos means the difference between equipment design speed and the actual operating speed. Some parts may not be able to run at a machines maximum rate (for example, machine can run large ranges of parts and larger parts may have to run slower per the OEM manual - so an ideal rate for each part should be established). Factors include:

- Mechanical problems
- Risk of making unacceptable parts at higher speeds
- Operator training

Self-Check -6	Written Test

Directions: Say True or False

1. Performance referred to as efficiency, is a measure of how good the machine runs while it is running (5 point)
2. Startup Losses is a yield loss that occurs during the early stages of production .(5 point?)

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

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

Information Sheet- 7 Carrying out Pre-start checks

7.1 Introduction

Prestart checks must be made to ensure equipment is not damaged on startup and also to prevent possible injury to personnel during start up, the operational status of safety systems must be checked.

7.2 Carrying out Pre-start checks

- Inspecting equipment condition (signs of wear)
- Selecting appropriate settings and/or related parameters
- Cancelling isolation or lock outs as required
- Confirming that required screens are fitted and related equipment is Clean and Correctly configured as per cleaning process requirements
- Positioning sensors and controls correctly
- Ensuring any scheduled maintenance has been carried out
- adjust and clean screens
- Confirming that all safety guards are in place and operational
- Check that equipment is plugged in correctly. For example you should never use double adapters to plug in multiple devices. If more than one device needs to be connected to power you would always use a power board.
- Ensure that the electrical cords are in good condition and not frayed or broken
- Ensure that equipment is properly ventilated. Most machines can get very hot and need to have a proper airflow around them to avoid damage.
- Start equipment in accordance with the organizations or manufacture's guidelines.
- Use safety guards or safety clothing (if applicable). Some equipment can have areas that can cause injury such as cutting blades and overheated areas. They will generally have safety guards or may require safety clothing (such as eye or ear protection) to be worn. You should also;

- Turn off all equipment when it is not in use. This prevents machines from overheating and perhaps causing damage, and saves on cost.
- Using business equipment is an unsafe manner is a hazard, not only to your own health and safety, but also to those around you, and possibly even the premises.

Self-Check -7	Written Test

Directions: Say True or False

1. Prestart checks must be made to ensure equipment is after damaged. (5 point)
2. Prestart checks prevent possible injury to personnel during startup. (5 point?)

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

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

Operation sheet -1	Undertake per-start check

Steps of operation sheet

1. Wear personal protective cloth.
2. Inspect equipment condition (signs of wear)
3. Select appropriate settings and/or related parameters
4. Cancel isolation or lock outs as required
5. Confirm that required screens are fitted and related equipment
6. Position sensors and controls correctly
7. Ensure any scheduled maintenance has been carried out
8. Confirm that all safety guards are in place and operational

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

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

Task 1.Conduct pre-start check

LG#23	Lo2 Operate and monitor the de-hulling process

Instruction sheet

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

- Adjusting, starting and operating de-hulling process
- Monitoring de-hulling equipment
- Identifying variation in equipment operations
- Reporting maintenance requirements
- Monitoring hull separation process
- Identifying out-of-specification product and process
- Maintaining the de-hulling process
- Maintaining work area
- Conducting legislative environmental guidelines
- Maintaining workplace information

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

- Adjust, start and operate de-hulling process
- Monitor de-hulling equipment
- Identify variation in equipment operations
- Report maintenance requirements
- Monitor hull separation process
- Identify out-of-specification product and process
- Maintain the de-hulling process
- Maintain work area
- Conduct legislative environmental guidelines

- Maintain workplace information

Learning Instructions

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

Information Sheet-1 Adjusting, starting and operating de-hulling process

1.1 Introduction

The purpose of hulling machine is to remove husk from any grain or seeds with minimum damage to the bran layer and as far as possible not to break the grains. Due to surface characteristics of different types of grains it is necessary to apply friction to the grain to remove the husk. Therefore, during hulling, certain percentage of broken cannot be avoided. In this respect the construction of machine, it's precision adjustment and the operation govern the optimum performance and the efficiency of the machine and best quality of grain production.

1.2 Adjusting, starting and operating de-hulling process

To maximize the process output of oilseed, grain and pulses, you need to separate hulls from their kernels efficiently. We offer a wide range of dehulling and hull separation processes which you can tailor to your own product. Loosen and remove the hull with mechanical treatments. Or add a hull control system to further increase process efficiency and yield

1.3 Method of Milling (de-hulling)

I. Wet de-hulling method

This method of processing is being adopted by comparatively smaller units. This method is practiced in southern india. The milling quality of this method was found to be good and on an average 72% recovery of grain

II. Dry de-hulling method

This method of milling of pulses is mostly adopted in the northern and central India. It varies widely from region to region. Dhal from dry milling method is said to have better cooking quality a wet milling.

1.4 Popular Industrialised Dehulling System

I Hot Dehulling

The most popular dehulling system to meet today's high protein/low fiber meal market is

Crown's Hot Dehulling System.

This system will produce the meal quality for 12 months of the year, even with hard to dehull new crop beans while maintaining hull fats of less than 1%. When processing high moisture beans, up to 13.5% moisture, directly from the field or within a couple of weeks of harvest, the Crown Hot Dehulling system will produce the high protein/low fiber meal as per the market requirements. With the Hot Dehulling system there is no need to install expensive, high maintenance Grain Dryers, Tempering Silo's, or Rotary Conditioners. In a standard conventional dehulling system the beans are heated twice, but in the Hot Dehulling system the beans are heated only once. A Vertical Seed Conditioner - 'VSC' is used to slowly heat the beans to 140°F [60°C] and dry the beans up to more than 2% moisture level. This heating and drying process results in very consistent conditioned beans in only 30 minutes. The patented Jet Dryer is then used for the final heating and drying.

II Warm Dehulling

The Warm Dehulling System is designed for areas of the world where imported beans are processed. With imported beans, the beans are harvested two to three months prior to processing and are naturally conditioned during the shipping process. There are only two changes from Hot Dehulling system to Crown's Warm Dehulling System. One is a slightly larger Crown VSC installed to heat the beans to proper flaking temperatures, 155°F [70°C] along with drying more than 2%. The other change is the Jet Dryer is no longer required, reducing installation costs. The remainder of the dehulling system is very similar to the Hot Dehulling system. The low fiber/high protein meal is still accomplished while maintaining hull fats close to 1%. The warm system is designed so the customer can upgrade to a complete hot Dehulling system in the future.

III Cold Dehulling

A Cold Dehulling System if plants have an existing preparation system that includes grain dryers and conditioners and want to add dehulling to produce a lower fiber meal. The cold system utilizes existing drying and conditioning equipment and installs the very efficient, patented Aspirators to separate the free hulls and meats after the cracker and conditioner.

Self-Check -1	Written Test

Directions: Say True or False

1. Dehulling system to meet today's high protein/low fiber meal market is Cold Dehulling System. (5 point)
2. Warm dehulling System is designed for areas of the world where imported beans are processed (5 point?)

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

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

2.1 Monitoring de-hulling equipment

Figure 2 Soybean dehulling machine

2.2 Equipment for De hulling

A Engle berg Huller

The most common machine used for paddy hulling in India is “Engle berg” huller. The working element of this machine is ribbed cast iron roller. The roller rotates on axis inside a large concentric cylinder. On the inner cast iron roller, spiral ribbed strip are mounted to ¼ part of the length and on remaining ¾ part 4 to 6 straight ribbed strips are mounted. The roller is rotated at 600 to 900 rpm. Paddy is fed into the hopper and due to rotational direction of flutes, it is moved around the cylinder and finally towards the outlet. Friction between the grain and the steel parts of the huller causes the husk and bran to be scraped off. The huller does the job of husking and bran removal simultaneously.

B Under Runner Disc Huller

The Under Runner disk hullers consist of two horizontal cast iron disks partly covered with an abrasive layer preferably of energy. The top disk is fixed with the body of machines, while the bottom disk rotates. The rotating disk is vertically adjustable by which clearance between the two disks is adjusted. As per the variety and the condition of grains, the clearance is decided. The condition of abrasive coating on the disks also affects the clearance. During hulling there is wear of abrasive coating and is not uniform over the entire surface of coating. Hulling is

mainly concentrated at the center; therefore, after some time a ridge is formed at the outer ring of coating.

C Rubber–Roll Sheller

Rubber-roll Sheller consists of two rubber rolls rotating in opposite direction at different speed. A feeder feeds uniformly to the machine. Feed is fed in thin layer between the rotating roll by the feeder. One of the roll is fixed while the other is adjustable to obtain desirable clearance between them. Speed of the rolls develops a shearing force on grain surface resulting in the opening and breaking of husk.

D Husk Separator

This machine is required to blow away husk from the mixture of shelled grains, husk and unshelled grain obtained from huller/Sheller. In the first stage the husk, brokers, germ and bran must be separated which is accomplished by the husk separator. It is a simple machine having a fan and an arrangement to distribute the product of Sheller uniformly on an oscillating sieve with fine perforation. This is done to ensure that air flows across uniformly and blows away the husk; the broken, germs and bran are separated through perforation while the immature grains are also blown away by fan. Some dehulling equipment's are:

- **Decorticator**

  Hull content of sunflower seeds varies between 30—40% depending on the variety. Its hull mostly contains crude fibre and in significant quantity of fat. It is usually removed before oil extraction otherwise its presence would cause great wear on machinery with higher energy requirement as well as its presence in cake or meal would reduce their biological value.

  Moreover, the hull would reduce the total yield of oil by absorbing and retaining oil in the pressed cake, hence its removal is must. Traditionally the hull of sunflower seed is removed by hand. The flattened shape of sun- flower seed presents an inherent difficulty for complete dehulling of the Seed using a disc huller as considerable proportion of seed escapes un decorticated. Anantpur for decorticating sunflower seed in a Bauer disc huller fitted with a plane emery disc with shaker and cyclone separator gave following results. Yield of coarse

meats: 70% Fine meats: 13% Free hulls 17% Proportion of uncut seed in the coarse meat after one recycling of meats over shaker separator 20%.

Figure 3 Hand Operated Bar Mill for decorticating Sunflower Seed

- **Cyclone**
- **Screener**
- **Hull beater**
- **mechanical/pneumatic stock transfer equipment**

Supporting systems may include:

- Compressors
- Aspirators
- Conveyors

Figure 4 Hull separator/dehulling/

Self-Check -2	Written Test

Directions: Say True or False

1. Husk Separator is required to blow away husk from the mixture of shelled grains. (5 point)
2. Rubber-roll Sheller consists of two rubber rolls rotating in opposite direction at different speed (5 point?)

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

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

Information Sheet-3 identifying variation in equipment operations

3.1 Introduction

Manufacturing processes have many factors that influence their success, and in each, the possibility of variation is introduced. The specific types of variation depend on what is being manufactured -- for example, an adhesive is affected by factors unlike those that affect a computer. In general, however, the outcome-specific factors fit into five major areas.

A Raw Materials

All manufacturing processes begin with raw materials, whether it's ore from the ground or the end result of previous manufacturing processes. If the raw materials change, that change can create variations in the overall process. There might be a difference in quality from the same supplier, which may fall within the specified limits but is still enough to cause variation in the next process, or material from a different supplier may not be identical to the one from the first supplier.

B Equipment

Whether a manufacturing process uses simple or complex equipment, changes in the equipment can cause variation. Variations occur with the use of more than one piece of equipment to complete the same task because even two pieces of equipment bought at the same time from the same company will not always behave exactly the same over time. Variations are also introduced in the performance of an individual piece of equipment, which can begin to break down or drift from the calibration point.

C Human Actions

Humans are by nature variable. Even with the best controls, an individual operator can have a bad day and introduce variations from one day to the next. Two different operators trained in the same way might have slightly different actions or criteria for decision making, which causes variation. Not all variation caused by human action can be considered human error, although that possibility also exists.

D Environment

Changes in temperature and humidity affect various processes. Also, some manufacturing processes require a clean room environment, and the introduction of particles from outside the clean room can cause variation. Changes in the environment have the ability to trigger changes in raw materials, equipment and human action, even if the environmental changes do not directly affect the manufacturing process

E Method

A manufacturing process is defined by a series of steps. Variation can be introduced if the time between the executions of the steps changes, the order of the steps changes, one is missed or a change is made in carrying out the step -- for example, if the step says to heat to a certain temperature but a different one is selected. Some variations in method can be tracked to variations in human action, but others may be approved alternatives.

Self-Check -3	Written Test

Directions: Say True or False

1. All manufacturing processes begin with raw materials, whether it's ore from the ground or the end result of previous manufacturing processes. (5 point)
2. Changes in temperature and humidity cannot affect various processes (5 point?)

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

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

Information Sheet-4 Reporting maintenance requirements

4.1 Reporting requirements of dehulling

Dehulling requires its own infrastructure. Separate bins or storage units are needed for the hulled and dehulled grains. The hulls need to be either stored or transported for their ultimate use, even if they are not being marketed. Dehulling creates dust that needs to be removed to avoid safety and health hazards. Equipment is needed to move the grain from trucks to bins and from bins to the dehuller. Such transfers are usually done by augers, though vacuums may also be used. If the dehuller is not equipped with a mechanism to separate kernels from hulls, then another means to do so will be necessary. Finally, given the reduced storage life of the dehulled grains, it is desirable to have the capacity to mill the grains into cracked grain or flour.

Grains are usually stored in the hull until the time that they are ground into flour. A dehuller that can accommodate multiple crops enables the cost of the investment to be spread over more crops. Most dehullers are able to handle different crops but the speed, yield, and efficiency varies between dehullers. Versatile dehullers may require modifications and additional parts customized to deal with specific grains, further adding to the labor costs and cash outlays. To determine whether it is worthwhile to purchase or build a dehuller, a producer should consider the advantages and disadvantages of having a dehuller:

4.2 Maintenance requirement

Machine maintenance solution was created to help effectively manage everyday activities related to industrial machines by reducing the time and effort needed for planning and performing these activities. This solution covers many different types of machinery maintenance, such as breakdown maintenance, preventive maintenance, time-based maintenance, periodic maintenance, condition monitoring, and others. Machine Maintenance solution you will be able to:

- Easily gather all the information that is related to a machine’s maintenance,
- Plan in advance and carry out the required inspections of every machine on time,

- Analyses information and data in order to optimise all the aspects of the machinery maintenance.

4.3 Benefits of maintenance

- Reduced amounts of machinery failures – equipment problems will be detected and will receive maintenance before they turn into expensive issues.
- Creation of a standardized maintenance procedure – the people responsible for the maintenance will be in sync with the situation at all times.
- Ensures that every required inspection is planned and performed on time – the system lets you create a maintenance schedule for the machines, equipment, groups of equipment, and others
- Increased average time between failures (MBTF) and better efficiency of the equipment.
- Increased operational time and lifecycle of machines – you will be able to gather and analyses all of the necessary information about the equipment's durability and performance.
- Increased efficiency of maintenance actions – maintenance managers will have more information to enable better planning of their maintenance related activities.
- Shortened time for service and maintenance actions and repairs – the system will ensure that regular inspections are performed on time.
- Identification of recurring equipment problems in order to correct all the causes – in the system you will be able to see the relationships between the maintenance requests and the reports of problems.
- Effective and convenient planning of preventive machine maintenance.
- Decreased quantity of demurrages.
- Prioritization of machine/equipment maintenance actions.
- Easy access to information – histories of inspections, overviews of the costs related to maintenance, maintenance reports, predictions of the next inspections, scheduled inspections, etc.
- Cost savings in the maintenance area

Self-Check -4	Written Test

Directions: Say True or False

1. Separate bins or storage units are needed for the hulled and dehulled grains. (5 point)
2. Most dehullers are able to handle different crops but the speed, yield, and efficiency varies between dehullers. (5 point?)

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

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

Information Sheet-5 Monitoring hull separation process

5.1 Introduction

Hull monitoring systems are fitted to acquire, display, and/or record information and then use that information for decision making to improve operational efficiency and/or safety. As oil seed and pulse processing is primarily interested in the enhanced safety aspects that can be obtained by the correct use of monitoring systems, any vessel fitted with a system and comply.

5.2 hull separation process

Hulling technology serves for partial removal of the hull from sunflower seeds and soybeans. Fiber content in the hulls is considerable, especially in the aforementioned types of oilseeds. Removing of at least a fraction of hulls in the processed material leads to a significant decrease of the overall fiber content in press cakes. Another advantage of hulling is higher oil yield during pressing.

5.3 Monitoring hull separation process

Monitoring systems covered by this Guide extend from simple one-motion monitoring systems to sophisticated voyage data recorders covering a multitude of hull, systems and machinery parameters. The overall Hull Monitoring process is one of:

- Data measurement
- Data collection and conditioning
- Data processing and evaluation
- Results presentation and storage

The Performance Specification of a Hull Condition Monitoring system must depend to a large extent on the system's intended use.

Self-Check -5	Written Test

Directions: Say True or False

1. Hull monitoring systems are fitted to acquire, display, and/or record information and then use. (5 point)
2. Removing of at least a fraction of hulls in the processed material leads to a significant decrease of the overall fiber content in press cakes. (5 point?)

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

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

6.1 specification

A specification is defined as a list of tests, references to analytical procedures, and appropriate acceptance criteria which are numerical limits, ranges, or other criteria for the tests described. It establishes the set of criteria to which a processing substance, processing product or materials at other stages of its manufacture should conform to be considered acceptable for its intended use. “Conformance to specification” means that the process substance and process product, when tested according to the listed analytical procedures, will meet the acceptance criteria. Specifications are critical quality standards that are proposed and justified by the manufacturer and approved by regulatory authorities as conditions of approval. Regulatory Approved Specification Specifications for release testing. If no release specifications have been established then the internal specification becomes the release specification.

6.2 Identifying out-of-specification product and process

An out-of-specification (OOS) test result is obtained. The purpose of the investigation is to determine the cause of the OOS result. The source of the OOS result should be identified either as an aberration of the measurement process or an aberration of the manufacturing process. Even if a batch is rejected based on an OOS result, the investigation is necessary to determine if the result is associated with other batches of the same drug product or other products. Batch rejection does not negate the need to perform the investigation. The regulations require that a written record of the investigation be made, including the conclusions and follow-up. To be meaningful, the investigation should be thorough, timely, unbiased, well-documented, and scientifically sound.

The first phase of such an investigation should include an initial assessment of the accuracy of the laboratory's data. Whenever possible, this should be done before test preparations (including the composite or the homogenous source of the aliquot tested) are discarded. This way, hypotheses regarding laboratory error or instrument malfunctions can be tested using the same test preparations.

If this initial assessment indicates that no meaningful errors were made in the analytical method used to arrive at the data, a full-scale OOS investigation should be conducted. For contract laboratories, the laboratory should convey its data, findings, and supporting documentation to the manufacturing firm's quality control unit (QCU), who should then initiate the full-scale OOS investigation.

A . Responsibility of the Analyst

The first responsibility for achieving accurate laboratory testing results lies with the analyst who is performing the test. The analyst should be aware of potential problems that could occur during the testing process and should watch for problems that could create in accurate results. Certain analytical methods have system suitability requirements, and systems not meeting these requirements should not be used.

For example, in chromatographic systems, reference standard solutions may be injected at intervals throughout chromatographic runs to measure drift, noise, and repeatability. If reference standard responses indicate that the system is not functioning properly, all of the data collected during the suspect time period should be properly identified and should not be used. The cause of the malfunction should be identified and, if possible, corrected before a decision is made whether to use any data prior to the suspect period. Analysts should check the data for compliance with test specifications before discarding test preparations or standard preparations.

When unexpected results are obtained and no obvious explanation exists, test preparations should be retained, if stable, and the analyst should inform the supervisor. An assessment of the accuracy of the results should be started immediately. If errors are obvious, such as the spilling of a sample solution or the incomplete transfer of a sample composite, the analyst should immediately document what happened. Analysts should not knowingly continue an analysis they expect to invalidate at a later time for an assignable cause (i.e., analyses should not be completed for the sole purpose of seeing what results can be obtained when obvious errors are known).

B . Responsibilities of the Laboratory

Supervisor Once an OOS result has been identified, the supervisor's assessment should be objective and timely. There should be no preconceived assumptions as to the cause of the OOS result. Data should be assessed promptly to ascertain if the results might be attributed to laboratory error, or whether the results could indicate problems in the manufacturing process. An immediate assessment could include re-examination of the actual solutions, test units, and glassware used in the original measurements and preparations, which might provide more credibility for laboratory error hypotheses.

The following steps should be taken as part of the supervisor's assessment:

I. Discuss the test method with the analyst; confirm analyst knowledge of and performance of the correct procedure. Contains Nonbinding Recommendations

II. Examine the raw data obtained in the analysis, including chromatograms and spectra, and identify anomalous or suspect information.

III. Verify that the calculations used to convert raw data values into a final test result are scientifically sound, appropriate, and correct; also determine if unauthorized or un validated changes have been made to automated calculation methods.

IV. Confirm the performance of the instruments.

V. Determine that appropriate reference standards, solvents, reagents, and other solutions were used and that they met quality control specifications.

VI. Evaluate the performance of the test method to ensure that it is performing according to the standard expected based on method validation data and historical data.

VII. Fully document and preserve records of this laboratory assessment. The assignment of a cause for OOS results will be greatly facilitated if the retained sample preparations are examined promptly.

Self-Check -6	Written Test

Directions: Say True or False

1. A specification is defined as a list of tests, references to analytical procedures, and appropriate acceptance criteria (5 point)
2. Batch rejection does not negate the need to perform the investigation. (5 point?)

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

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

7.1 Maintaining the de-hulling process

- Batch or continuous and
- apply to single or multiple product types

7.1.1 Batch or continuous process

Batch oil processing plant is quite suitable for small capacity vegetable/edible oil making plant, which capacity ranges from 1TPD to 20TPD.These batching stages are Degumming, Neutralizing, Decolonization and Deodorization. Continuous processing plant is another method used to purify vegetable oil but in this case we will focus more on the batch oil refinery stage to stage. The aim of batch oil refinery is to remove impurities such as wax, gum, unfiltered proteins and free fatty acids from crude oil and get pure vegetable oil as the end product. This process also includes removing coloring and smells from the oil ensuring high quality end product. The process happens in stages hence the name of the machine used is batch oil refinery plant.

7.1.2 Apply to single or multiple product types

A single product appears to be a single product with lists of options for each variation. However, each option represents a separate, simple product with a distinct, which makes it possible to track inventory for each variation while multiple product presents multiple, standalone products as a group. You can offer variations of a single product, or group them for a promotion. The products can be purchased separately or as a group.

Self-Check -7	Written Test

Directions: Say True or False

1. Batch oil processing plant is not quite suitable for small capacity vegetable/edible oil making (5 point)
2. A single product appears to be a single product with lists of options for each variation (5 point?)

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

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

Information Sheet-8 Maintaining work area

8.1 Introduction

It is the duty of all employees to co-operate with the Board of Governors in fulfilling our legal obligations in relation to health and safety. Employees must not intentionally or recklessly interfere with anything provided in the interests of health, safety or welfare. Employees are required to notify to management of any unsafe activity, item or situation.

8.2 Working Practices

- Employees must not operate any item of plant or equipment unless they have been trained and authorised.
- Employees must make full and proper use of all equipment guarding.
- Employees must not clean any moving item of plant or equipment.
- Employees must not make any repairs or carry out maintenance work of any description unless authorised to do so.
- Employees must use all substances, chemicals, liquids etc, in accordance with all written instructions.
- Employees must not smoke except in prescribed areas.

8.3 Hazard / Warning Signs and Notices

- Employees must comply with all hazard/warning signs and notices displayed on the premises.

8.4 Working Conditions / Environment

- Employees must make proper use of all equipment and facilities provided to control working conditions/ environment.
- Employees must keep stairways, corridors, classrooms and work areas clear and in a clean and tidy condition.
- Employees must dispose of all rubbish, scrap and waste materials using the facilities provided.

- Employees must clear up any spillage or liquids in the prescribed manner.
- Employees must deposit all waste materials and substances at the correct disposal points and in the prescribed manner.

8.5 Protective Clothing and Equipment

- Employees must use all items of protective clothing/equipment provided as instructed.
- Employees must store and maintain protective clothing/equipment in the approved manner.
- Employees must report any damage, loss, fault or unsuitability of protective clothing/equipment to their supervisor.

8.6 Fire Precautions

- Employees must comply with all laid down emergency procedures.
- Employees must not obstruct any fire escape route, fire equipment or fire doors.
- Employees must not misuse any firefighting equipment provided.
- Employees must report any use of firefighting equipment to their supervisor.

8.7 Accidents

- Employees must seek medical treatment for work related injuries they receive by contacting a
- Designated first aider. Upon returning from treatment they must report the incident to their
- Supervisor.
- Employees must ensure that any accident or injury treatment is properly recorded in the Accident
- Book.
- Employees must notify management of any incident in which damage is caused to property.

Self-Check -8	Written Test

Directions: Say True or False

1. Employees must comply with all hazard/warning signs and notices displayed on the premises. (5 point)
2. Employees must not intentionally or recklessly interfere with anything provided in the interests of health, safety or welfare .(5 point?)

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

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

Information Sheet-9 Conducting legislative environmental guidelines

9.1 Conducting legislative environmental guidelines

9.1.1 Ethiopian Food Standards Code,

- ✓ Mandatory oil seed standards, edible oil standards, labeling

Table 1 the following list is made according to the notice to importers published in December 2013 on the website of the Ministry of Trade of Ethiopia

LIST OF PRODUCTS SUBJECT TO THE PROGRAM					
GROUP I – FOOD AND FOOD PRODUCTS					
Category Number	**Ser. No.**	**HS Codes**	**Product**	**Ethiopian Standard Number**	**Ethiopian Standard Title**
I-32	05	12	Oil seeds	CES 05-2013	Oil Seeds-Specification
I-33	06	12	Oil seeds	CES 06-2013	Oil Seeds Method Of Packaging
I-34	12	15	Edible oil additives	CES 12-2013	Edible Oils-Specification For Additives
I-35	21	15	Edible Vegetable oil	CES 21-2013	Edible Vegetable Oils-Packing
I-36	16	1508	Edible groundnut oil	CES 16-2013	Groundnut (Peanut) Oil-Specification
I-37	17	1512.1	Sunflower seed oil	CES 17-2013	Sunflower Seed Oil-Specification
I-38	19	1512.2	Edible cottonseed oil	CES 19-2013	Cottonseed Oil-Specification
I-39	18	1515.1	Edible linseed oil	CES 18-2013	Linseed Oil-Specification
I-40	14	1515.2	Edible maize oil	CES 14-2013	Maize Oil-Specification
I-41	15	1515.5	Edible sesame seed oil	CES15-2013	Sesame Seed Oil– Specification
I-42	20	1515.9	Edible Niger seed oil	CES 20-2013	Niger Seed Oil-Specification
I-43	13	1514	Edible rapeseed oil	CES 13-2013	Rapeseed Oil-Specification
I-44	56	2009.1	Concentrated orange Juice	CES 56-2013	Concentrated Orange Juice-Specification

Ethiopia – List of compulsory standards and regulated products
Ed : 1.0
2/9

9.1.2 Weights and measures legislation

The Standards of Weights and Measures, enforces uniform standards of weights and measures, based on the metric system. Based on the suggestions of General Conference of Weights and Measures (CGPM), International Organization of Legal Metrology (OIML), the 1956 act was replaced by a comprehensive legislation, The Standards of Weights and Measures are administered by the ministry of Consumer affairs, Food and Public Distribution.

9.1.3 EFDA (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."

9.1.4 Environmental management (Environmental Protection Authority)

The Establishment of the Federal Environmental Protection Authority (EPA) By proclamation No. 9/1995 Has Been the most important step in setting up the legal framework for the environment in Ethiopia at the federal level. The EPA has a well-established organizational structure (see Figure 2.1 below) with a technical department in place concerning EIA. The accountability of EPA for the administration of environmental protection at the federal level is exclusive with environment matters

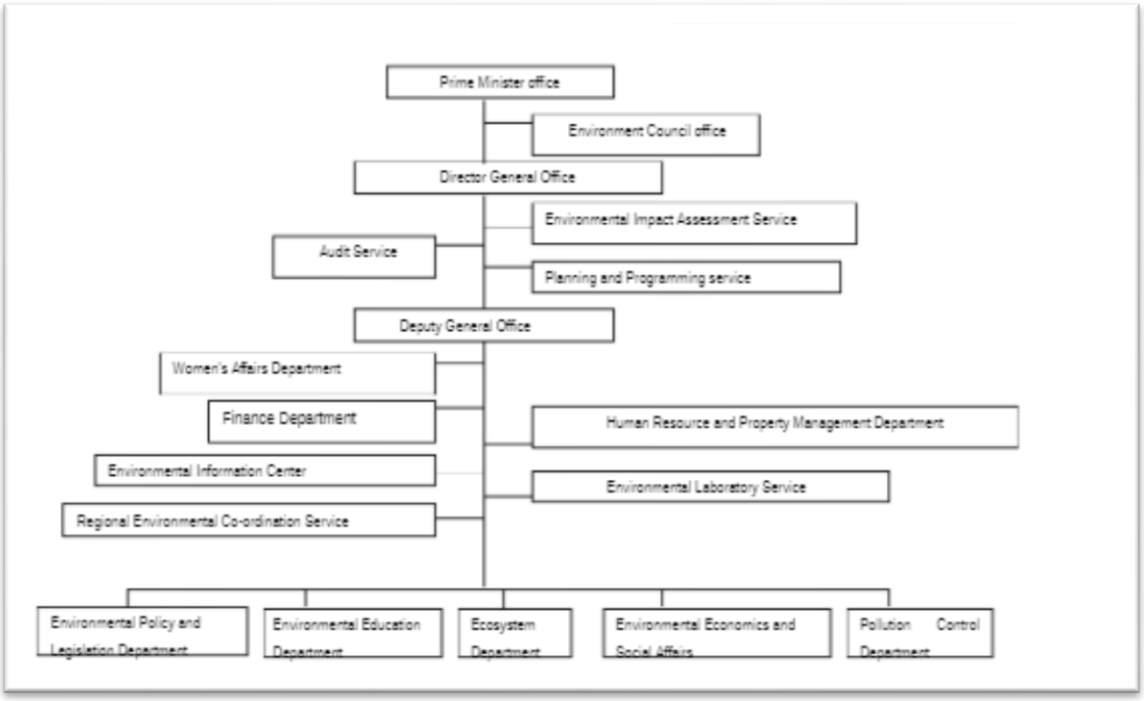

Figure 5 Structural arrangement of the federal environmental agency of Ethiopia

9.1.5 Occupational Health Safety ,anti-discrimination and equal opportunity

Under both pieces of legislation, it is the legal duty of the employer to ensure that the workplace is free from discrimination and harassment. In a recent decision, it was insufficient for an employer to simply explain employees' rights and confirm a policy of equal opportunity to avoid blame when allegations of discrimination and harassment arise. Active and material steps have to be taken to create an appropriate work culture.

The employer must also ensure that a person is not sexually harassed. In 2011, amendments to the (federal) Sex Discrimination Act 1984 made it unlawful for "a person to sexually harass another in the course of seeking, or receiving, goods, services or facilities from that person". Yet, sexual harassment is prevalent in Australian workplaces. One in four women have experienced harassment at work, and men's harassment of other men is also on the rise.

A number of 2013 cases and decisions demonstrated that courts and tribunals will hold employers vicariously liable for the unacceptable conduct engaged in by their employees, and to make orders (including significant amounts of compensation or damages to the employee) against individual harassers, directors and independent contractors whose actions either constitute sexual harassment or otherwise contribute to such harassment taking place. The same could apply if employers take no action when a client or customer sexually harasses an employee.

If you believe you are being discriminated or harassed, take the issue to both the OHS rep and your union delegate. If you are the OHS rep, contact your union for more advice and assistance.

Self-Check -9	Written Test

Directions: Say True or False

1. The EPA has a well-established organizational structure (5 point)
2. Ethiopian food safety regulatory system is authorized and mandated in Parliamentary Proclamation.(5 point?)

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

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

10.1 Maintaining workplace information

10.1.1 Standard Operating Procedures (SOPs)

An SOP is a procedure specific to your operation that describes the activities necessary to complete tasks in accordance with industry regulations, provincial laws or even just your own standards for running your business. Any document that is a “how to” falls into the category of procedures. In a manufacturing environment, the most obvious example of an SOP is the step by step production line procedures used to make products as well train staff.

An SOP, in fact, defines expected practices in all businesses where quality standards exist. SOPs play an important role in your small business. SOPs are policies, procedures and standards you need in the operations, marketing and administration disciplines within your business to ensure success. These can create:

- Efficiencies, and therefore profitability
- Consistency and reliability in production and service
- Fewer errors in all areas
- A way to resolve conflicts between partners
- A healthy and safe environment
- Protection of employers in areas of potential liability and personnel matters
- A roadmap for how to resolve issues – and the removal of emotion from
- Troubleshooting – allowing needed focus on solving the problem
- A first line of defense in any inspection, whether it be by a regulatory body, a partner
- Potential partner, a client, or a firm conducting due diligence for a possible
- Purchase
- Value added to your business should you ever wish to sell it

Developing an SOP is about systemizing all of your processes and documenting them. Every business has a unique market, every entrepreneur has his/her own leadership style, and every industry has its own best practices. No two businesses will have an

identical collection of SOPs. Below is a listing of just a few typical SOPs, which you will want to consider writing for your own small business.

Production/Operations

- production line steps
- equipment maintenance, inspection procedures
- new employee training

10.1.2 Production schedules and instructions

Scheduling is the process of arranging, controlling and optimizing work and workloads in a production process or manufacturing process. Scheduling is used to allocate plant and machinery resources, plan human resources, plan production processes and purchase materials.

It is an important tool for manufacturing and engineering, where it can have a major impact on the productivity of a process. In manufacturing, the purpose of scheduling is to minimize the production time and costs, by telling a production facility when to make, with which staff, and on which equipment. But it's an academic purpose. From a business point of view, the first priority purpose is to keep the customer's due date. Most major factories ask for scheduling to smooth flow production, level the production, keep safety stock, keep cycle time, or keep assigning jobs to auto-machines or lines as the next priority.

10.1.3 Manufacturers' advice

Oil services companies provide a very wide range of outsourced operational support to oil companies, such as owning and renting out oil rigs, conducting seismic testing and transporting equipment. The fortunes of these companies follow the price of oil: when oil is expensive, oil companies drill a lot and make a lot of money, so business volume and revenue increase for their oil services contractors. Working for an oil services company can feel very much like working for an oil company, given the similarity in issues and activities.

Self-Check -10	Written Test

Directions: Say True or False

1. Scheduling is not the process of arranging, controlling and optimizing work and workloads in a production process or manufacturing process. (5 point)
2. Standard Operation Procedures are policies, procedures and standards you need in the operations, marketing and administration disciplines.(5 point?)

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

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

Operation sheet 2 operate dehulling /decortication / process

Equipment needed

- Decorticator
- Cyclone
- Screener
- Hull beater
- mechanical/pneumatic stock transfer equipment

Step1. Wear personal protective cloth

Step 2 .Apply safe work practices and identify OHS hazards and controls

Step3 .Conduct pre-start checks on machinery and equipment used for de-hulling

Step4 .Take corrective action in response to typical faults and inconsistencies

Step5. Adjust process equipment to achieve required quality outcomes

Step6. 7-20 kg capacity for decortication of sunflower.

Step7 .Start dehulling process

Step8 .Safely shut down equipment

Step9 .Complete workplace records as required

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

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

Task 1.Conduct edible oil dehulling process

LG#24	Lo3 Prepare de-hulling 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:

- Identifying shutdown procedure
- shutdown procedures
- Identifying and reporting maintenance requirements

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

- Identifying shutdown procedure
- shutdown procedures
- Identifying and reporting maintenance requirements

Learning Instructions:

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

Information Sheet-1 Identifying shutdown procedure

1.1 Identifying shutdown procedure

The types of shutdowns used in a plant unit are:

- Scheduled shutdown
- Maintenance shutdown
- Emergency shutdown
- Trips
- Shut down to a standby condition.

1.1.1 Scheduled shutdown

A scheduled shutdown is initiated by the operator during normal operation of the unit when:

- Maintenance is required
- Feed supply is low or exhausted.

The shutdown procedure will depend on the type of equipment and the process chemistry.

Some steps taken in a unit shutdown may include:

- Shutting off the feeds to stop processes and heat generation particularly if processes are exothermic (produce heat)
- Recirculating feeds from supply tanks so they do not enter the unit
- Shutting off heating or cooling to the unit or feed preheat system
- Shutting off mixing and other mechanical operations
- Cooling and flushing materials from the unit

1.1.2 Maintenance shutdown

When maintenance to the unit equipment is required, the equipment may need to be entered so that work can take place. The shutdown should be a scheduled or planned shutdown as per Standard Operating Procedures where equipment is:

- Isolated (process, mechanical and electrical)
- Cooled and depressurized
- Purged and gas freed
- Cleaned
- Gas tested on a continuous basis prior to and during entry.

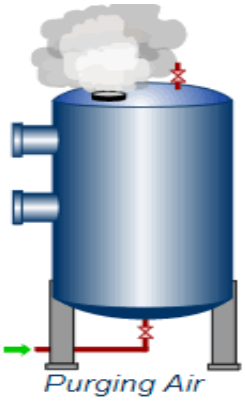

Figure 6 Purging Air

A planned unit shutdown will prevent:

- Plugging of lines or equipment
- Possible damage to equipment
- Possible injury.

To prepare the unit for shutdown, the unit may need to be:

- Thoroughly drained and pumped out to remove chemical liquids
- Purged with steam or inert gas to remove vapours
- Solvent washed to remove deposits that build up on the equipment's internal surfaces
- Flooded with water or a solvent to remove any remaining chemicals
- Any chemicals trapped in the unit must be flushed out.
- Isolated to prevent the entry of hazardous chemicals
- Drained
- Steam cleaned to remove remaining deposits.

During decontamination, regular sampling of the atmosphere inside a unit vessel is required to ensure toxic or explosive atmospheres do not build up inside the unit that could be a hazard to equipment or personnel. Gas testing must be carried out before

anyone enters the vessel to ensure the atmosphere is not toxic, explosive or oxygen deficient.

1.1.3 Emergency shutdown

An emergency shutdown is initiated in the event of a fire, major spill, instrument failure, power failure, or total loss of control of chemical or physical processes. Emergency shutdown procedures must be followed during a shutdown sequence.

1.1.4 Trips

Shutdown of a unit can be initiated by the automatic shutdown system. The systems may be shut down automatically because of temperatures, fluid levels, pressures or flows that are above or below trip points.

Typical shutdowns initiated by trips may include:

- Low liquid level in a vessel
- High liquid level in a storage tank
- High viscosity causing increased load on pumping or mixing equipment
- Mixer failure
- Pressure to high
- Temperature to high
- Low feed flows.

1.1.5 Shutting down to a standby condition

When a unit is to be shut down for a short period of time for maintenance on auxiliary equipment, the unit is shut down to a standby condition. A standby shutdown allows a quick startup of the unit after maintenance is completed in order to minimise lost production time and off spec material. Standard Operating Procedures must be referred to when shutting down each type of unit to a standby condition.

A typical stand by condition may include:

- Recirculating material upstream and downstream
- Reduced heating or cooling
- Slow-rolling compressors
- Venting process gases to flare
- Diverting process streams

Self-Check -1	Written Test

Directions: Say True or False

1. Trips shutdown of a unit can be initiated by the automatic shutdown system. (5 point)
2. Maintenance shutdown is initiated in the event of a fire, major spill, instrument failure, power failure, or total loss of control of chemical or physical processes.(5 point?)

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

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

Information Sheet-2 Shutdown procedures

2.1 Shutdown procedures

Shutdown procedures is for the preparation to checked including:

- To turn the steam to the heating unit on or off at the proper time
- To establish adequate vapor seals with the extraction buildings
- To avoid the potential for residual build up
- To prevent mismatched flow and abnormal equipment performance
- To good coordination between each section of the process and perfect communication among operation.

Self-Check -2	Written Test

Directions: Give short answer

1. Write shutdown procedures. (5 point)
2. Write the difference between maintenance shutdown and emergence shutdown. (5 point?)

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

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

Information Sheet-3 Identifying and reporting maintenance requirements

3.1 Identifying and reporting maintenance requirements

The development of maintenance policy for technical equipment involves the systematic application of a set of defined processes. These processes are collectively referred to as maintenance requirements determination (MRD).The MRD process involves:

3.1.1 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 (FMECA).

3.1.2 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. The corrective maintenance determination is focused on identifying the necessary repair actions required to return an item to serviceability. The preventative maintenance outcome is identified by the application of reliability centered maintenance (RCM)-based methodologies.

3.1.3 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 to perform the task

- Facilities.
- Support and test equipment.

3.1.4 Level of repair analysis (LORA).

This consists of specialized models that look at the life-cycle cost (LCC) of performing maintenance tasks under different support scenarios. Used to determine the most cost-effective maintenance policy for a system or equipment. Maintenance policy must be subjected to appropriate LORA to ensure that defence resources are being efficiently and effectively utilised. Many of the commercially available LORA models are packaged with functions such as spares optimization and LCC analysis (LCCA).

3.1.5 Logistic support analysis record.

The results of MRD must be documented in a manner that will enable the data to be used and updated throughout the material life cycle. Because MRD and LSA require similar inputs and share many common processes, the MRD results can be readily stored in a logistic support analysis record (LSAR) that has been modified with unique ADF tables.

3.1.6 Performance monitoring and analysis.

Performance monitoring, which involves the proactive monitoring of the maintenance program, can take many forms and utilise a variety of tools. The main aim is to identify developing trends or degraded performance. Such signs indicate the necessity of adjustment or review of one or more elements of the maintenance program, or of logistics support.

Self-Check -3	Written Test

Directions: Give short answer

1. What are maintenance requirements determinations? (5 point)
2. ----------is based on the definition of system operational requirements and the system or equipment maintenance concept. (5 point)

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

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

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