# Fruit and vegetable processing level II

Based on May, 2019 Version 2 Occupational standards

## Module Title: - Operating Side by Side Utilities

LG Code: IND FVP2 M05 LO (1-5) LG (14-18)

TTLM Code: IND FVP2 TTLM 1020v1

October 2020

# Table of Contents

| LG #13 | LO #1- Prepare for work |
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# Instruction sheet

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

- Identifying work requirements
- Identifying and controlling hazards

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

- Identify work requirements and control hazards

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

# Information Sheet 1- Identifying work requirements

## 1.1. Introduction

This module covers the knowledge, attitudes and skills needed to to use of a range of utilities and services in the plant. It includes the selection of the appropriate utility/service from those provided to the plant and recognizing and responding to operational problems as required. Utility is neither a reactant nor a product, But Utilities are required for maintaining adequate conditions of a manufacturing unit. Utility area is an important area of a Chemical Plant. **Air, water, steam, refrigeration, fuel, furnace, insulation** etc., are the common utilities used in chemical Plants. Use utilities in a sentence. noun.

Utilities mean useful features, or something useful to the home such as electricity, gas, water, cable and telephone. Examples of utilities are brakes, gas caps and a steering wheel in a car and electricity and water. The four types of economic utility are form, time, place, and possession, whereby utility refers to the usefulness or value that consumers experience from a product. In generally, side by side operation includes all service utilities which form part of the utility system. Particularly, for your plant this may include (select relevant items): steam - saturated, superheated, air - process, instrument, breathable, water - cooling, boiler feed, plant, waste, inert atmosphere - nitrogen, carbon dioxide and flushing oil.

## 1.2. Identifying work requirements

Work requirements are qualifications and skills necessary for a certain position and usually written in form of a list that contains the most important qualifications that a candidate must possess in order to be able to perform certain job duties skills (soft skills and/or technical skills). The first and most important step to take towards working more efficiently is to have a daily plan in place. It is important that your plan is written down somewhere: On a calendar, notepad, or stored on your computer. Do not simply go through a

mental checklist each day. Keep planning and organizing work activities simple in order maximize effectiveness. Determine Specific Tasks brainstorm all required tasks throughout the day, Prioritize and Sequence Tasks. Group tasks together, Set Realistic Timetables, Remove and Potential Distractions.

The right to earnings-related unemployment allowance, basic unemployment allowance or labour market support is determined by whether you meet the work requirement. Work requirement for earnings-related unemployment allowance. A job description contains the following components: job title, job purpose, job duties and responsibilities, required qualifications, preferred qualifications and working conditions. However, if you alternate between work and unemployed, you need not meet the work requirement every time. If you withdraw yourself from the labour market for more than 6 months without an acceptable reason, you cannot be paid unemployment allowance until you again meet the work requirement.

## 1.3. Factors of work requirement

Prepare for Work provides basic information, knowledge and skills required to prepare the learner for the world of work. Prepare for Work will assist learners to establish personal development goals of pathway planning and to explore further options for work, independence, decision-making, and social goals of responsibility to others e.g. with regard to the safe use of materials and equipment. Some introductory experience in real (or simulated) working environments will prepare learners for their own future working life. The range of factors that may occur in any workplace that will affect your ability to complete tasks to the required standard or by the required time. You need to consider these possibilities when you are planning your schedule or monitoring your progress.

- Factors that may affect your work requirements include:
    - Competing demands;
    - Time constraints;
    - Equipment breakdown;

- Lack of resources;
- Organizational difficulties;
- Changes in procedures;
- Environmental factors

- However, these factors will have different impacts on your work requirements. You can address them by:
  - changing your schedule
  - requesting additional resources
  - asking your supervisor or more experienced colleagues for help
  - Learning new skills.

| Self-check 1 | Written test |
|---|---|

Name…… ID…… Date…

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

**Test I: Choose the best answer** (5 point)

1. The first and most important step to take towards working more efficiently is to have a daily plan in place.

A. True B. False C. A & B

2. Types of factors that may affect your work requirements include: -

A. Competing demands B. time constraints C. equipment breakdown D. lack of resources E. environmental factors F. All

**Answer Sheet**

Score = _____

Rating: _____

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

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

# Information Sheet 2- Identifying and controlling hazards

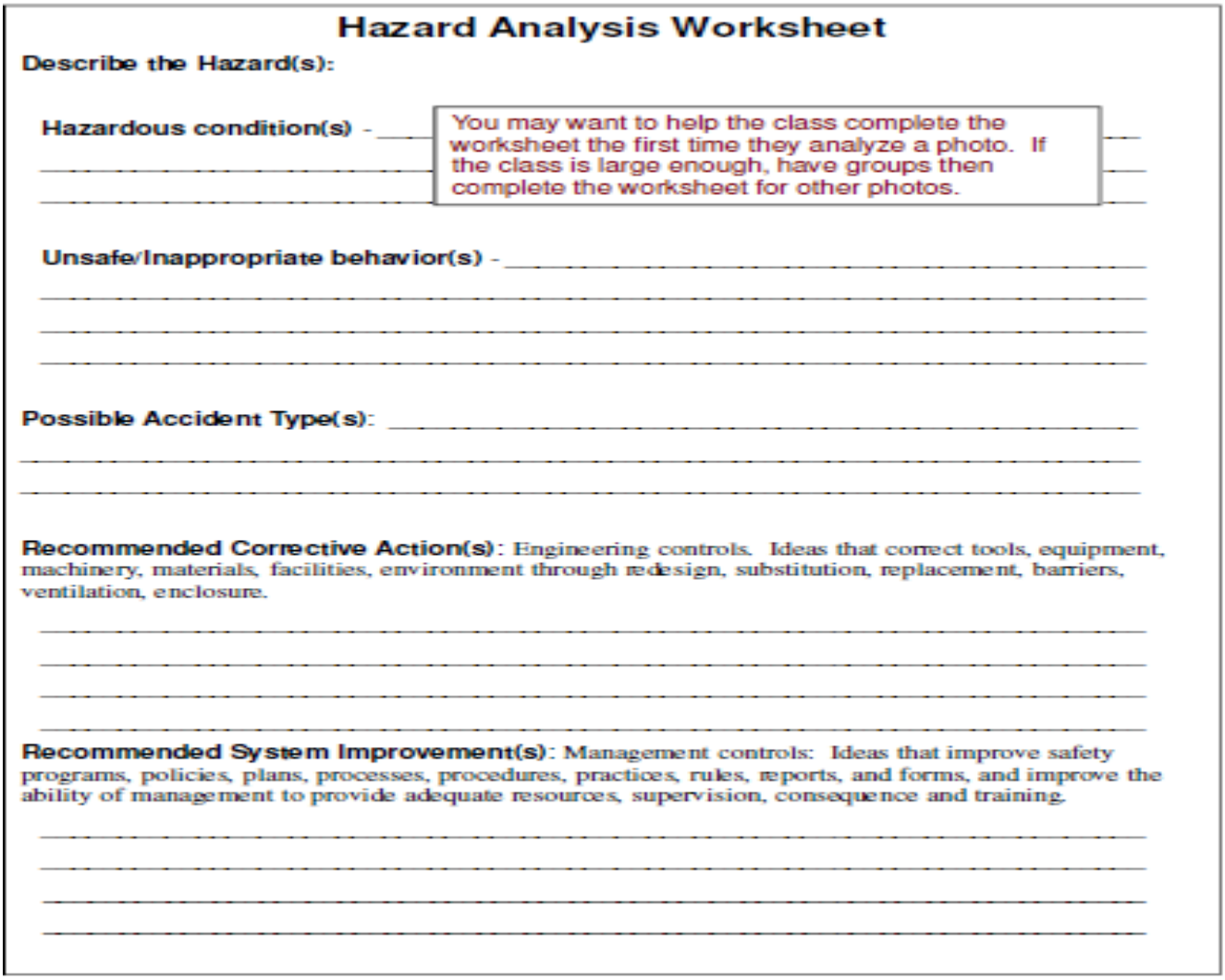
## 2.1. Definition

**Hazard identification** is part of the process used to evaluate if any particular situation, item, thing, etc. may have the potential to cause harm identify hazards and risk factors that have the potential to cause harm (hazard identification). A hazard is any source of potential damage, harm or adverse health effect on something or someone. Basically, a hazard is something that can cause harm or adverse effects such as to individuals as health effects, to the environment or to organizations as property or equipment damage. Whereas, the meaning of the word hazard can be confusing. Often dictionaries do not give specific definitions or combine it with the term "risk". Additionally, a hazard is the potential for harm or an adverse effect (for example, to people as health effects, to organizations as property or equipment losses, or to the environment).in generally, the hazard is an agent which has the potential to cause harm to a vulnerable target. While, a potentially damaging physical event, phenomenon and/or human activity, which may cause loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can be single, sequential or combined in their origin and effects.

According to their causes, hazards are often grouped into three main classes: natural, technological, and man-made or social disasters. As mentioned above and pointed out in its definition, hazards may have interrelated causes and the allocation of a hazard to one class is often difficult. For example, a landslide might be triggered by heavy rainfall but determined in its severity by deforestation, chemical contamination, damage of machines, fire, environmental impact. Over all, the hazards related with fruit and vegetable processing may include biological, chemical, physical and physiological

hazards. workplace hazards are any aspect of work that cause health and safety risks and have the potential to harm. Some hazards are more likely to be present in some workplaces than others are, and depending on the work that you do, there will be hazards that are more or less relevant to your business.

## 2.2. Hazard Identification and Control



**Hazard Analysis Worksheet**

**Describe the Hazard(s):**

**Hazardous condition(s)** - _____

You may want to help the class complete the worksheet the first time they analyze a photo. If the class is large enough, have groups then complete the worksheet for other photos.

**Unsafe/Inappropriate behavior(s)** - _____

**Possible Accident Type(s)**: _____

**Recommended Corrective Action(s)**: Engineering controls. Ideas that correct tools, equipment, machinery, materials, facilities, environment through redesign, substitution, replacement, barriers, ventilation, enclosure.

_____

**Recommended System Improvement(s)**: Management controls: Ideas that improve safety programs, policies, plans, processes, procedures, practices, rules, reports, and forms, and improve the ability of management to provide adequate resources, supervision, consequence and training.

_____

*Fig.1 Hazard Identification and Control*

A hazard is an agent, which has the potential to cause harm to a vulnerable target. Hazards can be classified as different types in several ways. One of these ways is by specifying the origin of the hazard. One key concept in identifying a hazard is the presence of stored energy that, when released, can cause damage. The words 'risk'

and 'hazard' are often used interchangeably. However, if you are responsible for managing the health and safety in your workplace, it's important that you understand the difference between them. The rest of this article focuses on hazards, including where they might be found in different workplaces.

### 2.2.1. Four Important Processes to Identify and Analyze Hazards

- **Inspection**: - Formal and informal safety inspections on a daily, weekly, monthly basis is important in making sure the workplace remains free of hazards that could cause injury or illness.
- **Report Identified Hazards**: -
  - ✓ Watch your language. Is the report considered a "concern" or a "complaint?"
  - ✓ Keep the process simple. How can we do that?
  - ✓ Recognize employees who report hazards
- **Incident/Accident Analysis**
- **Analyze Probability and Severity to Determine** Risk It is extremely valuable, when writing an effective inspection report, to include estimates of the risk a hazard imposes on employees. Risk may be thought of as the sum of the probability and severity of a potential accident.

Generally, the six main categories of hazards are:

- **Biological**. Biological hazards include viruses, bacteria, insects, animals, etc., that can cause adverse health impacts. For example, mould, blood and other bodily fluids, harmful plants, sewage, dust and vermin.
- **Chemical**. Chemical hazards are hazardous substances that can cause harm. These hazards can result in both health and physical impacts, such as skin irritation, respiratory system irritation, blindness, corrosion and explosions.
- **Physical**. Physical hazards are environmental factors that can harm an employee without necessarily touching them, including heights, noise, radiation and pressure.

- **Safety**. These are hazards that create unsafe working conditions. For example, exposed wires or a damaged carpet might result in a tripping hazard. These are sometimes included under the category of physical hazards.
- **Ergonomic**. Ergonomic hazards are a result of physical factors that can result in musculoskeletal injuries. For example, a poor workstation setup in an office, poor posture and manual handling.
- **Psychosocial**. Psychosocial hazards include those that can have an adverse effect on an employee's mental health or wellbeing. For example, sexual harassment, victimization, stress and workplace violence.

## 2.2.2. Controlling ways of work place hazards

The best way to protect yourself and your employees from workplace hazards is to identify and manage them and take reasonable steps to prevent their potential to harm. In order to control workplace hazards and eliminate or reduce the risk, you should take the following steps: -

- ✓ identify the hazard by carrying out a workplace risk assessment;
- ✓ determine how employees might be at risk;
- ✓ evaluate the risks;
- ✓ Record and review hazards at least annually, or earlier if something changes.


*Fig-2 major hazard controlling ways*

| **Self-Check – 2** | **Written test** |
|---|---|

Name…… ID…… Date…….

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

**Test I: Short Answer Questions (2 point for each).**

1. Define the term hazards
2. List the categories of hazards
3. In order to control workplace hazards and eliminate or reduce the risk, you should take the following steps: -

4. List four Important Processes to Identify and Analyze Hazards

5. Explain each categories of hazards: -

**Answer Sheet**

Score = _____

Rating: _____

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

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

| **LG #14** | **#LO2.Select and use utilities and services** |
|---|---|

# Instruction sheet

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

- Identifying available side by side utilities and services
- Identifying key properties, applications and limitations
- Selecting appropriate utility/service
- Using selected utility/service

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

- Identify available side by side utilities, key properties, applications, limitations and services

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

# Information Sheet 1- Identifying available side by side utilities and services

## 1.1. Identifying utilities and services

**Utility** is a term in economics that refers to the total satisfaction received from consuming a good or service. The economic utility of a good or service is important to understand, because it directly influences the demand, and therefore price, of that good or service. Utilities may vary place-by-place, but common utilities include electric, natural gas, water, garbage and sewer services. You may also pay for other utility bills, including telephone and cable bills. Process industries are typically served by utility systems that provides the necessary energy to carry out day-to-day operations.

- The most common side by side utility and service include:
  - **Steam** (saturated and super-heated),
  - **Air** (process, instrument and breathable),
  - **Electricity and water** (cooling, boiler feed, plant and waste),
  - **Inert atmosphere** (nitrogen, carbon dioxide) and
  - **Flushing oil**.

Everything is fixed in a cylindric container; the coarse trap is arranged on the bottom zone, and the superheating tubes are arranged along the container axis almost up to the container top around a pipe. Saturated (dry) steam results when water is heated to the boiling point (sensible heating) and then vaporized with additional heat (latent heating). If this steam is then further heated above the saturation point, it becomes superheated steam (sensible heating). If the saturated steam produced in a boiler is exposed to a surface with a higher temperature, its temperature will increase above the evaporating temperature. The steam is then described as superheated by the number of temperature degrees through which it has been heated above saturation temperature. Steam can be superheated without applying high pressure. The steam drying operates by a course- and a fine trap. The subsequent superheating occurs in a superheating tube nest. A breathing gas is a

mixture of gaseous chemical elements and compounds used for respiration. Air is the most common, and only natural, breathing gas.

The process of taking water out of a boiler to reduce the economizer the section of a boiler used to preheat feed water before it enters the used to recover waste heat energy and cool the flue gas stream from afire tube boilers pass hot combustion gases through the tubes to heat water on the shell side. The magnitude of the stack loss for boilers without recovery is operate boilers at peak efficiency plants having two or more boilers can save temperature between steam and sub-cooled condensate. Boiler feed water is an essential part of boiler operations.

Inert atmospheric gases are not ingredients or processing aids but serve an oxygen displacement which do not have to be identified on the ingredient statement can be added to the head space of a bottle of organic olive oil or in a vacuum listing for Argon, but not Carbon Dioxide and Nitrogen. Flushing with nitrogen is a common industry practice to extend the shelf life of beverages. Gases primarily used include oxygen, carbon dioxide, and nitrogen. Carbon, nitrogen, an inert gas, is used in MAP and other food packages to displace previous practice of vacuum packing caused juices and oils in the meat

| Self-Check – 1 | Written test |
|---|---|

Name…… ID…… Date…….

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

**Test I: Short Answer Questions (4** point for each**)**

1. List the importance of the economic utility of a good or service
2. Write down all the most common side by side utility and service.

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

**Answer Sheet**

Score = _____

Rating: _____

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

# Information Sheet 2- Identifying key properties, applications and limitations

## 2.1. Identifying key properties

**Key properties** means each of the freehold and leasehold properties owned by members of the Target Group at specified location. Key Properties invests in a range of commercial asset types with a focus on value-added potential. Utility is a term in economics that refers to the total satisfaction received from consuming a good or service. Utility is the quality in goods to satisfy human wants. Thus, it is said that wants satisfying capacity of goods or services is called Utility. The economic utility of a good or service is important to understand, because it directly influences the demand, and therefore price, of that good or service. Utilities expense is the cost incurred by using utilities such as electricity, water, waste disposal, heating, and sewage. On the other hands, Utility is a term in economics that refers to the total satisfaction received from consuming a good or service. Economic theories based on rational choice usually assume that consumers will strive to maximize their utility. The expenses are incurred over the course of the reporting period, calculated, and payment is rendered. It does not matter whether an invoice has been sent by the utility supplier to the company. There are five types of different utilities that can be generated for a consumer by a firm. These are: form utility, task utility, time utility, place utility, and possession utility.

- **Description of utility: -**

- Utility, in economics, refers to the usefulness or enjoyment a consumer can get from a service or good.
- Economic utility can decline as the supply of a service or good increases.
- Marginal utility is the utility gained by consuming an additional unit of a service or good.

Utility is neither a reactant nor a product, But Utilities are required for maintaining adequate conditions of a manufacturing unit. Utility area is an important area of a Chemical Plant. Air, water, steam, refrigeration, fuel, furnace, insulation etc. are the

common utilities used in Chemical Plants. **Limitations** of Utility Analysis are: The assumption that utility can be measured cardinally (or numerically) is not true as utility is a subjective concept and varies from person to person and from time to time. Utility analysis assumes that marginal utility of money is constant. Implies that the law of diminishing marginal utility cannot be applied to goods, such as television and refrigerator. This is because the consumption of these goods is not continuous in nature.

Generally, Utility the ability of a good to satisfy a want. Total utility (TU) The total satisfaction received from consuming a good or service. Marginal utility (MU) The extra utility received from consuming one additional unit of a good. Total and Marginal Utility Goods are desired because of their ability to satisfy human wants. The property of a good that enables it to satisfy human wants is called utility. As individuals consume more of a good per time period, their total utility (TU) or satisfaction increases, but their marginal utility diminishes. Marginal utility (MU) is the extra utility received from consuming one additional unit of the good per unit of time while holding constant the quantity consumed of all other commodities. The limitations of using steam in the plant are: heat and pressure hazards, corrosion, thermal stress and maintaining a balanced steam supply.

| Self-Check – 2 | Written test |
|---|---|

Name…… ID…… Date…….

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

**Test I: Short Answer Questions (4 point each)**

1. What is the value of key properties?
2. Define the term utility?

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

**Answer Sheet**

Score = _____

Rating: _____

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

# Information Sheet 3- Selecting appropriate utility/service

### 3.1. Select Utilities and Services

**Utility services** include telecommunications, electrical utilities, natural gas, certain transportation services, and water and wastewater treatment services provided by private companies. The Division does not represent consumers of water and wastewater services provided by city and county government agencies. Utilities and services are essential to plant operations. They provide power for machinery, air for breathing, steam for heating and water for emergencies. Matching the right services to each job is a daily task. This section introduces you to different types of utilities and services, identifies what makes them useful, and explains the jobs they are used for: identify utilities and services, identify key features, Select appropriate utilities and services and assessment tasks.

The main utilities and services used in the chemical, hydrocarbons and oil refining industries are:

- Steam
- compressed gas – plant air/instrument air
- plant/utility water – cooling water

## 3.1. 1. Key features of plant steam services

- ✓ **Steam is used in a plant because:**

- **Boilers** are efficient at converting heat from burning fuel (fuel gas or fuel oil) into steam energy
- **Superheated steam** can be used in a steam turbine to drive pumps, compressors, fans and other rotating machinery

- **Saturated steam** can be used to heat process fluids in heat exchangers or steam coils
- **Steam** that is condensed to become condensate can be collected and returned to the boiler for re-use
- **Waste heat** from the plant can be used to generate steam
- Using waste heat boilers to generate steam reduces boiler fuel costs and can make steam more economical than electricity as an energy source.

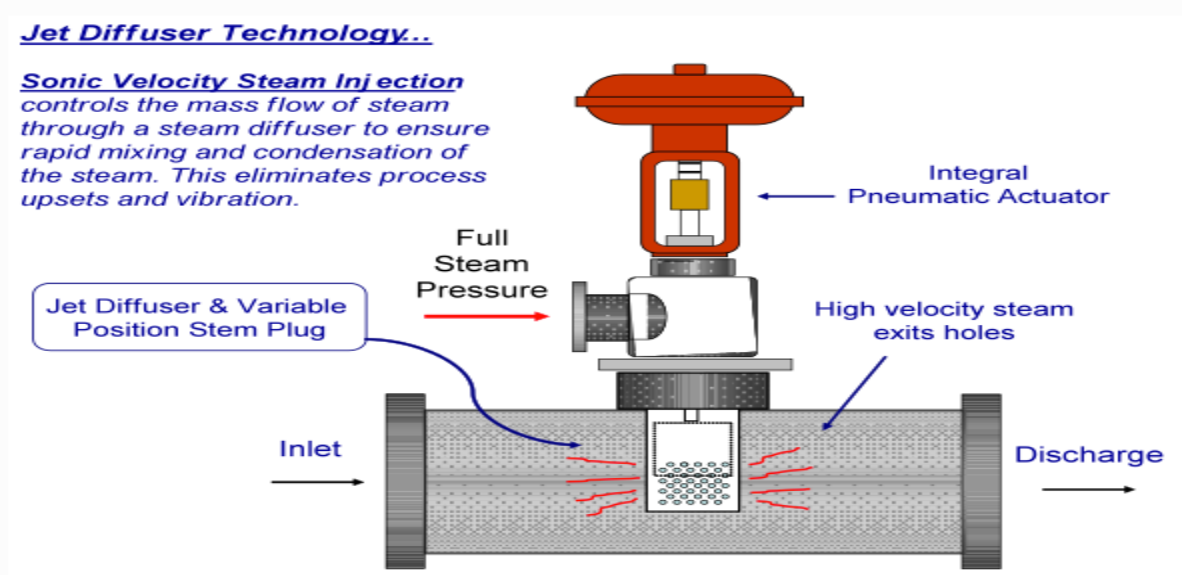



*Fig 3.1. AP-42 Vegetable fruit and potato processing*

## 3.1.2. Key features of compressed gas services

- **Instrument air**

✓ Instrument air is used as an energy source to operate pneumatic instruments and pneumatic control valves. Instrument air must always be:

- Clean with a low level of contaminants
- Dry with a very low moisture content.

- **Plant or service air**

✓ Plant air must have sufficient pressure and flow capacity and is used:

- To power pneumatic tools and equipment
- For duties such as air blowing and sand blasting
- For purging inert gases from vessels to allow entry.

➢ **Breathing air**

Breathing air undergoes a special filtration process to ensure it is safe for humans to inhale. Other compressed air supplies such as plant air or service air are not safe for breathing purposes.

➢ **Nitrogen**

Nitrogen is used because it is inert (that is, it will not burn or support combustion).

## 3.1. 3. Key features of plant water services

❖ **Plant or process water**

✓ Plant water is used in the process plant because:

- Water can be easily heated or cooled
- Water is relatively cheap and easily obtainable
- Water is easily distributed using basic pumping equipment
- Water can be treated then re-used in the plant
- Water is not flammable or toxic
- Water can be used for extinguishing fires
- Water is generally a solvent for many compounds, and can be used in many chemical processes to dissolve and control the concentration of soluble chemicals
- Water is useful for spill cleanup and flushing out equipment.

❖ **Portable or fresh water**

Fresh water is usually obtained from town water supplies, but on offshore platforms or at remote locations fresh water can be produced from salt water using desalination units.

✓ Potable water must meet specified quality standards to ensure it is fit for human consumption and can be used for:

- Drinking
- Cooking and food preparation
- Showering and washing.

## 3.2. Selecting appropriate utility and service

### Selection of plant steam services

✓ Steam is used for many duties in the plant such as:

Heating, driving machinery, moving materials, snuffing, purging, vaporizing and steam tracing.

#### A. Heating

✓ The heat contained in steam is used to heat process fluids by:

- passing the steam through a heat exchanger or heating coils
- Sparging the steam directly into the process fluid.

#### B. Driving machinery

The pressure of steam can be used to drive steam turbines or reciprocating steam engine drivers. The steam energy is converted into mechanical energy in the turbine or steam engine, which can be used to drive pumps, compressors, blowers and generators. Superheated steam, sometimes called dry steam, must be used in steam turbines to ensure none of the steam condenses inside the turbine. If steam condenses inside the turbine, water droplets could collide with the high-speed rotors to cause severe mechanical damage. The exhaust steam from the turbine contains latent heat, which can be used for heating process fluids in other process equipment.

#### C. Moving materials

When a jet of steam is passed through a venturi, a vacuum is created which can be used to pump liquids and gases. These devices, called Ejectors, are typically used to pump out sumps and pits, or are used on towers or vessels to create a vacuum or to remove gases.

### D. Snuffing

Snuffing is the action of smothering a fire by using steam. As steam is inert and will not burn, it replaces the air around the fire causing it to suffocate. Typically, steam is used on pump glands or furnace fires.

### Selection of compressed gas services

✓ Types of compressed gases used in a plant include:

Instrument air, plant air, breathing air and nitrogen.

### Selection of water services

✓ Water is used for many purposes in the plant including:

- Cooling,
- Steam production,
- Housekeeping,
- Hygiene,
- Safety and
- Process washing.

✓ **Various types of water are used in a plant:**

- Cooling water
- Boiler feed water
- Condensate
- Fresh water
- Waste water

| Self-Check – 3 | Written test |
|---|---|

Name…… ID…… Date…

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

Test I: Short Answer Questions (5point each)

1. The main utilities and services used in the chemical, hydrocarbons and oil refining industries are:

1.----------

2.----------

3. ----------

2. List the use of steam in the plant:

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

**Answer Sheet**

Score = _____

Rating: _____

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

# Information Sheet 4- Using selected utility/service

## 4.1. Plant utilities and services

Although you may not have to run a boiler or a compressor in your job, you will still need to know the key parts of each system so you can recognize which situations might be inappropriate or hazardous. Using utilities and services must be a coordinated team effort to avoid problems, hazards and waste.

All operations involving utilities in the plant are covered in the Standard Operating Procedures and must be followed to ensure safe, efficient operation of such services, processes and equipment. Failure to follow the correct Standard Operating Procedure may result in injury to the operations technician, damage to equipment or wastage of resources. If personnel are unsure of any tasks or procedures outlined in the Standard Operating Procedures, they must consult with their supervisor or a more experienced colleague.

**The standard operating procedures** are located in the plant control room or library. Other resource materials such as equipment manuals and emergency procedure manuals should also be used to gain more knowledge of the plant services.

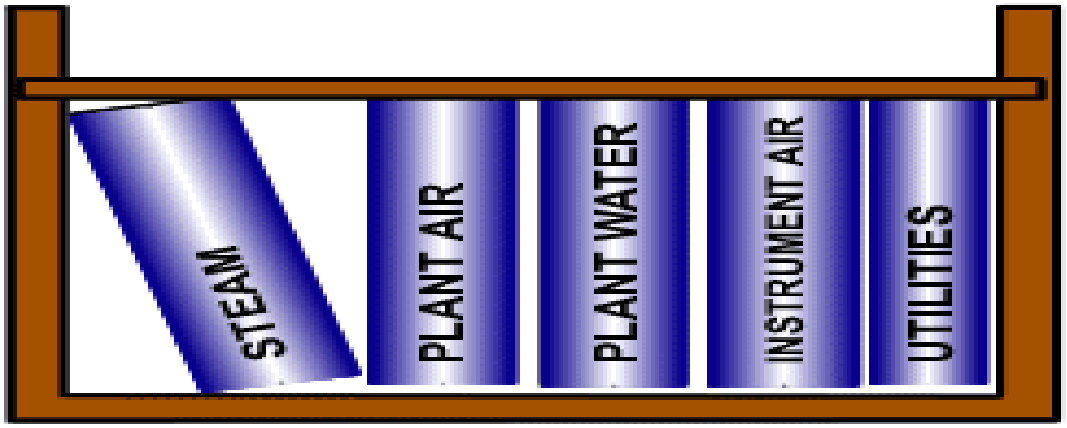


*Fig- 4.1. Access Standard Operating Procedures*

## 4.2. Identify components

### 4.2.1. Components of plant steam services

The main components of the plant steam system are: water treatment plant, boilers, waste heat recovery units (using cogeneration), boiler feed water pumps, distribution headers, steam traps, let down valves, expansion loops, condensate recovery systems.

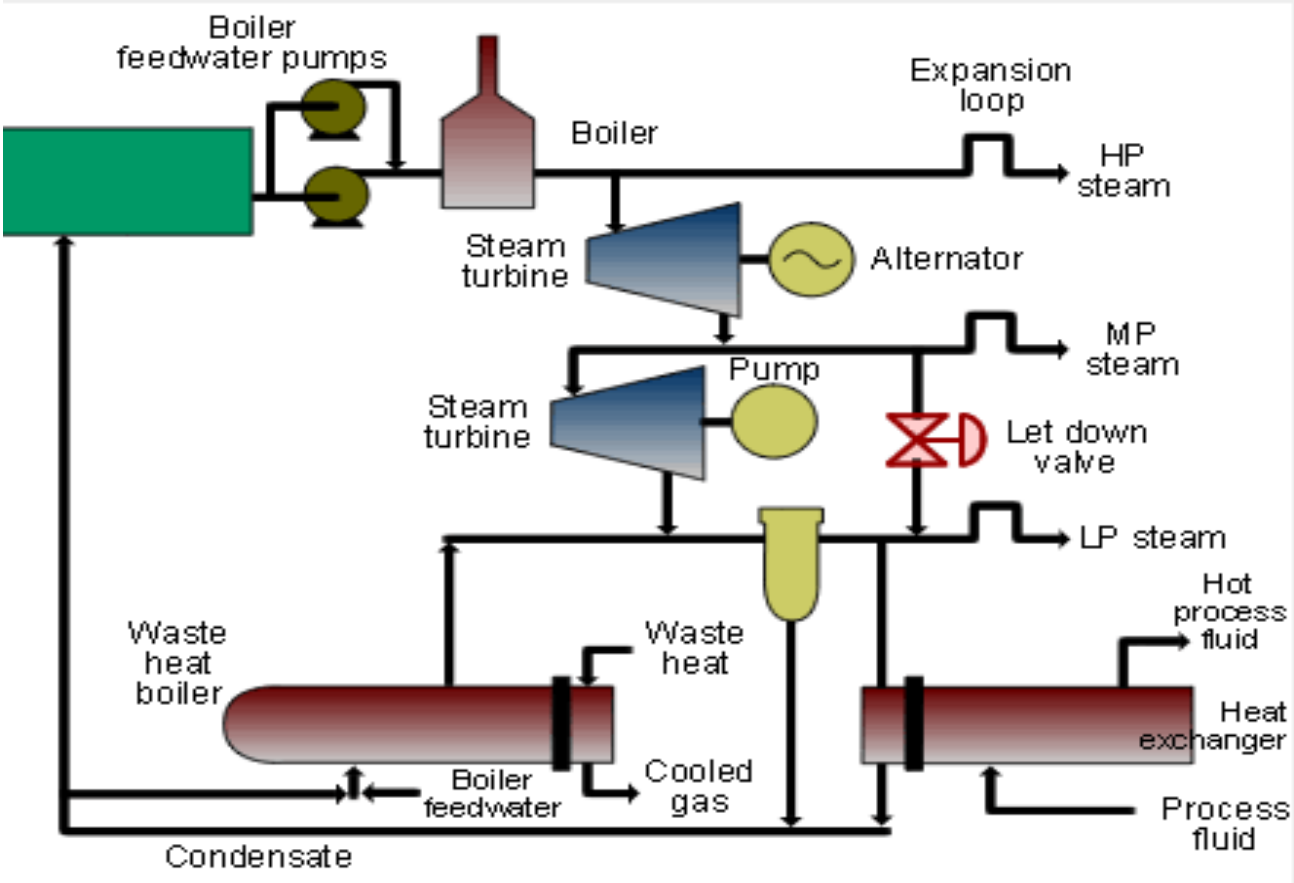



*Fig-4.2. Components of a typical steam system*

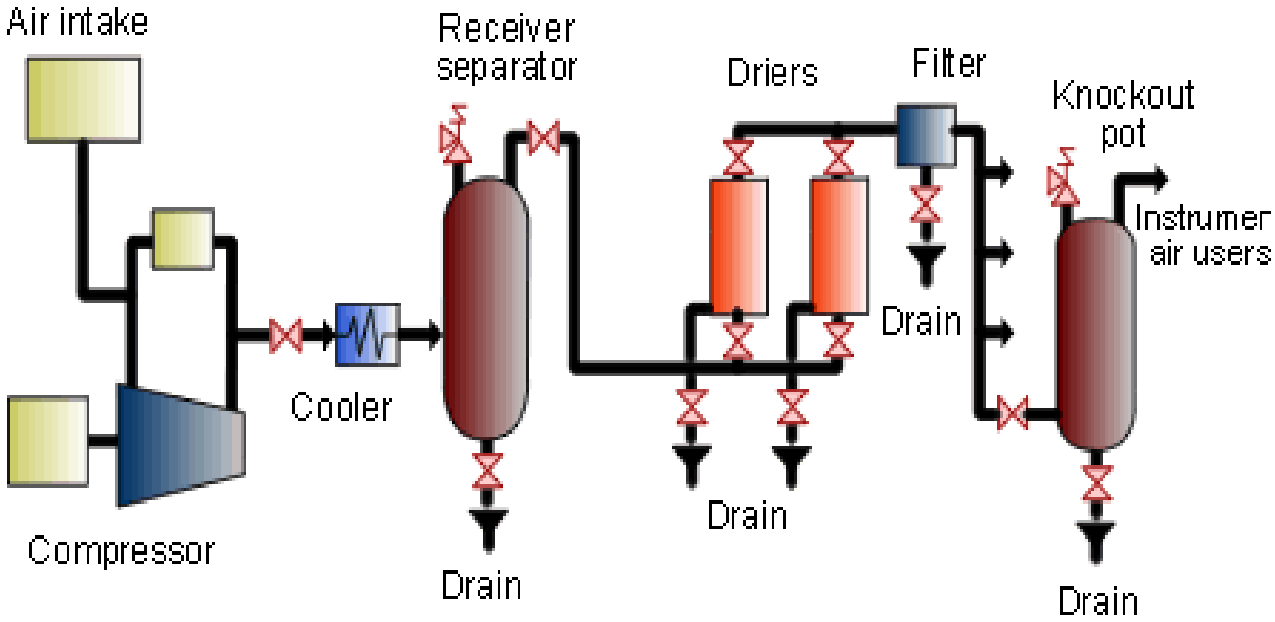
### 4.2.2. Components of compressed gas services

- The main components of compressed gas services are:
  - Instrument air,

- Plant air,
- Breathing air and
- Nitrogen.

**Instrument air**

- The main components of an instrument air system are the:
  - Air compressor,
  - Cooler,
  - Receiver separator,
  - Drier,
  - Filter and
  - Distribution header.




*4.3. Instrument air system*

### 4.2.3. Components of water services

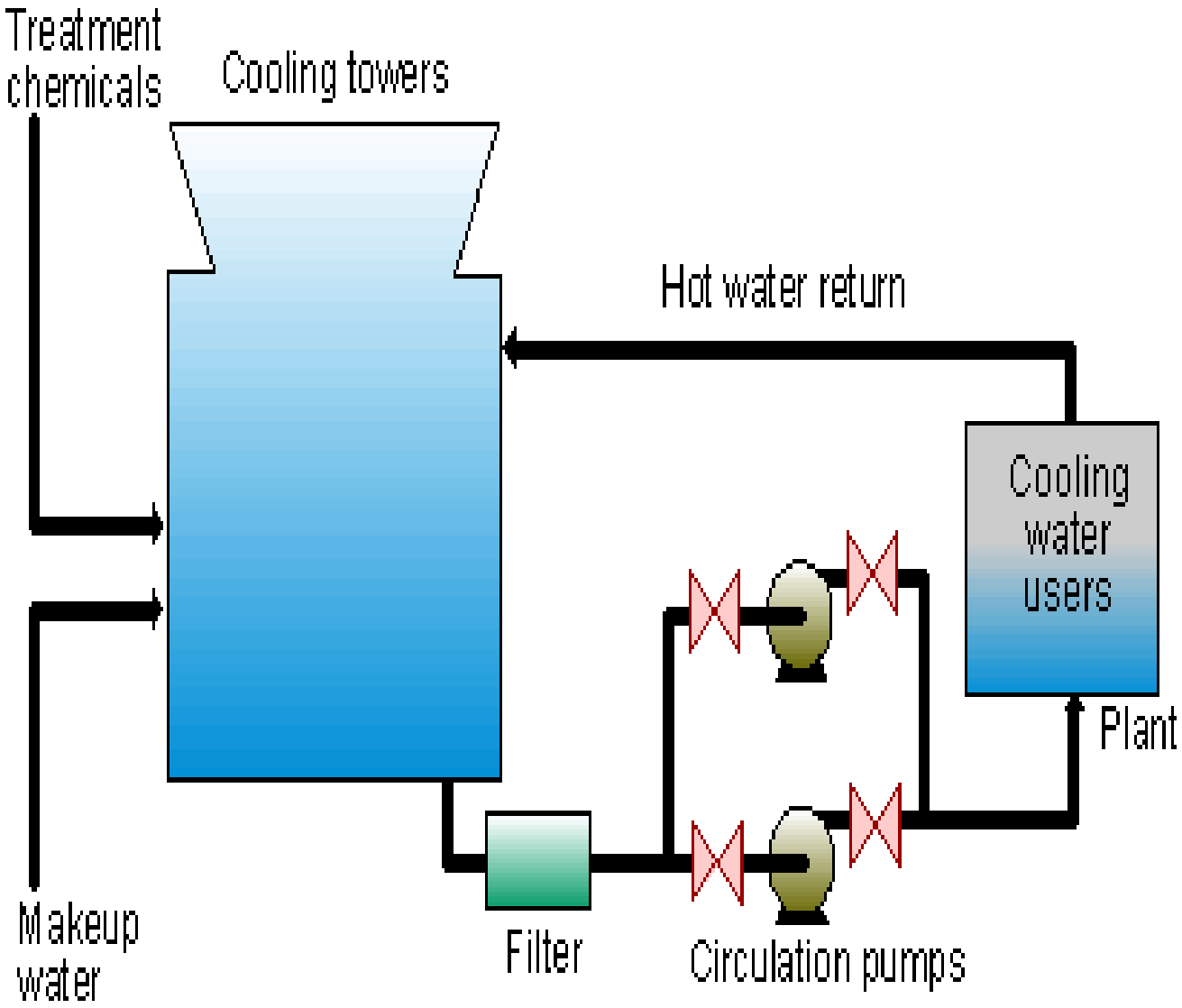
- The main components of plant water services include:
  - Cooling water,
  - Waste water and
  - Fresh water.

**Cooling water components**

- The main components of the plant cooling water system are the:

- ✓ Circulation pumps
- ✓ Treating facilities
- ✓ Filtration equipment

- ✓ Cooling towers.




*4.4. Cooling Water System*

# Self-Check – 4

Name…… ID…… Date…….

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

Test I: Short Answer Questions (5point each)

1. All operations involving utilities in the plant are covered in the Standard Operating Procedures and must be followed to ensure safe, efficient operation of such services, processes and equipment:

A. True

B. False

2. List the main components of the plant steam system:

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

Answer Sheet

Score = _____

Rating: _____

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

| LG #15 | LO #3- Respond to problems |
|---|---|

# Instruction sheet

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

- Monitoring the use of utility/services
- Measuring data and senses
- Recognizing operational problems
- Analyzing Cause of operational problems
- Taking appropriate action

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**:

- Monitor the use of utility/services, recognize operational problems and take appropriate action.

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

# Information Sheet 1- Monitoring the use of utility/services

## 1.1. Introduction

Utility monitoring allows companies to manage their utilities intelligently, giving the business and the employees great benefits. The utility sector is a category of company stocks that provide basic services including electricity, natural gas, and water. Utilities earn a profit but are a public service and, as a result, have substantial regulation. The utility sector tends to do well as a defensive play against macroeconomic downturns. Utilities in a home include electricity, gas, water, sewer, Internet, telephone, cable TV, security systems and, in some areas, trash collection. These essentials are the things you need in daily life to ensure you have a working, comfortable, livable space. Monitoring, targeting and reporting your utility consumption enables you to see when and where you are using the gas, power and water that supplies your machinery and site/s. By monitoring your consumption, you can help take control and reduce your costs. Most utility companies provide either electric power or natural gas for heating and cooking although some provide both. Many companies generate the power, as well as distribute it. Some companies act as brokers and sell energy produced by one company to another company or a large manufacturing client.

Utility monitoring allows companies to manage their utilities intelligently, giving the business and the employees great benefits. Unfortunately, utility consumption is often invisible and companies look at it as fixed cost that they must pay. Utility monitoring systems are put into place to help reduce costs through building automation management making businesses more environmentally and financially sustainable. Advanced Control Corporation helps their clients operate their building automation within their budgets, identifying problem areas and helping them correct in efficiencies.

| Self-Check – 1 | Written test |
|---|---|

Name…… ID…… Date…

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

Test I: Short Answer Questions (6point each)

1. Explain the benefits of monitoring utility/services;
1. ----------
2. ----------
3. ----------

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

Answer Sheet

Score = _____

Rating: _____

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

# Information Sheet 2- Measuring data and senses

## 2.1. Introduction

**Sense and data** are the alleged mind-dependent objects that we are directly aware of in perception, and that have exactly the properties they appear to have. Defenders of sense data have argued, among other things, that sense data are required to explain such phenomena as perspectival variation, illusion, and hallucination. Sensation is perhaps one of the most complex senses. It allows us to the data collected allow the investigator to infer nerve fiber population function. Common sense has many different guises and a fundamentally sociological dimension; whereas common knowledge refers to a collective epistemic state that has been formally defined. In particular, common sense often involves some common knowledge; and common knowledge cannot exist without some underlying common sense.

Common sense is required for practical living but knowledge is necessary for perfect and progressive life, for self-evolution. The two are not related but both are equally important for a credible debate or lecture. Knowledge is an educational endeavour, whereas common sense is a social endeavour. The definition of common sense refers to having sound judgment, not necessarily based on specialized knowledge. When you are smart, levelheaded and able to understand and assess a situation, this is an example of having a lot of common sense.

Sense data are taken to be mind-dependent objects whose existence and properties are known directly to us in perception. These objects are unanalyzed experiences inside the mind, which appear to subsequent more advanced mental operations exactly as they are. Sense data are often placed in a time and/or causality series, such that they occur after the potential unreliability of our perceptual systems yet before the possibility of error during higher-level conceptual analysis and are thus incorrigible. They are thus distinct from the 'real' objects in the world outside the mind, about whose existence and properties we often *can* be mistaken. Talk of sense data has since been largely

replaced by talk of the closely related qualia. The formulation *the given* is also closely related. None of these terms has a single coherent and widely agreed-upon definition, so their exact relationships are unclear. One of the greatest troubling aspects to 20th century theories of sense data is its unclear rubric nature.

## 2.2. Measuring Data and Sensory

**Sensory evaluation** is defined as the scientific discipline, which encompasses all methods to evoke measure, analyze and interpret human responses to the properties of foods and materials, as perceived by the five senses: taste, smell, touch, sight and hearing. Traditionally, taste and smell human taste panels measure attributes. E-noses and E-tongues are measurement systems to measure smell and taste. They work the same way as humans do: They capture molecules of taste and smell on a receptor, analyze the raw data and recognize the taste and smell. Sensory evaluation is a scientific discipline used to evoke measure, analyze, and interpret reactions to characteristics of materials/substrates, as they are perceived by the senses of sight, smell, taste, touch, and hearing. Taste sensitivity depends on the number of taste receptors on taste buds and the number of taste buds on the tongue. To measure this, scientists use a wafer that contains a drop of a chemical called 6-n-propylthiouracil, or PROP, which has a nasty bitter taste.

An observation is information we gather about something by using the senses. We have five senses. They include the sense of sight, hearing, taste, touch, and smell. We use our senses to gather information about the world around us. Senses refer to the ability to see, taste, touch, smell, and hear. Our sense receptors send signals to the brain. The brain analyzes the sensory information and tells the body what to do in response.

| Self-Check – 2 | Written test |
|---|---|

Name…… ID…… Date…….

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

Test I: say true or false (5point each)

1. Sense and data are the alleged mind-dependent objects that we are directly aware of in perception, and that have exactly the properties they appear to have.
2. Common sense is required for practical living but knowledge is necessary for perfect and progressive life, for self-evolution.

Answer Sheet

Score = _____

Rating: _____

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

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

# Information Sheet 3- Recognizing operational problems

## 3.1. Introduction

Utilities companies are continuously facing change. While technology can be a salve and solution to many problems, preventive and proactive real estate acquisition may provide flexibility for future service to the next. During the manufacturing process, there are many production issues that can occur: poor quality, long lead times, high on-hand inventory, supply chain interruptions, etc. These things all affect the product you are putting out there, which in turn affects the public's perception of your brand.

- **Type of operational problems in plant may include**:
  - Non-supply of products and Element,
  - Variation in product and element feed rates,
  - Variations in temperature,
  - Pressure and flow,
  - Blockages or leakage.

- **Steps for an effective problem-solving process.**
  - Identify the issues.
  - Understand everyone's interests.
  - List the possible solutions (options)
  - Evaluate the options.
  - Select an option or options.
  - Document the agreement(s).
  - Agree on contingencies, monitoring and evaluation.

# Self-check- 3

Name…… ID…… Date…

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

Test I: Short Answer Questions (5point)

1. List type of operational problem may occur in plant/industries

Answer Sheet

Score = _____

Rating: _____

***Note:*** **Satisfactory rating – 2.5 points** **Unsatisfactory - below 2.5 points**

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

# Information Sheet 4- Analyzing Cause of operational

## 4.1. Identifying problems

What are operational issues in business? In any kind of business, operational issues are any kind of problem that arises which can render a business less profitable. As this article will make clear, there are many different categories, which make up operational issues, each with their own undesirable results. Every problem is unique, this is true, but problem solving does not have to be a guessing game. Effective business problem solving is something that can be mastered by following a simple, methodical approach.

## 4.2. Step process for effective problem solving during analyzing:

- Understand the problem
- Define the root cause
- Identify possible solutions
- Implement the solution that gives you the most “bang for your buck”
- Define success & monitor results.

❖ **Understand the problem**

If you cannot explain what the problem is, you cannot begin to solve it. Let’s take a practical example: Sales figures are unusually low. Some questions you may want to kick off with include: How long has this been a problem? How was the problem identified? Who are the key players? and what are the downstream impacts?

❖ **Define the root cause**

You have probably heard the saying: “treat the problem, not the symptom”. Doctors like to use that line a lot, but it is actually very solid advice. Once you have identified the problem and you understand its symptoms, take a few steps back to identify the root cause. If we take our example from step 1, you will find that the root cause for low sales

figures could be anything from competitor behavior, to team morale/low incentive, or even technology factors, which are hindering the sales process.

- **Identify possible solutions**

Do not settle for the first solution that is identified. The more solutions you consider, the better your chances of finding the right fit. We believe that business solutions must always consider the people, process and technology aspects of solving the problem. It is seldom that technology alone can solve a business problem. Brainstorming is a powerful technique for generating ideas as it provides a platform for your team to apply their specific skills and knowledge to the problem. It is important, however, to try and include people with different functional expertise and from different levels within the business to ensure that you are tackling the problem from all possible angles.

- **Implement the solution that gives you the most "bang for your buck"**

It is tempting to go for the cheapest or quickest option, but that does not always mean it is the best one for your business. On the flipside, it is also important not to overcomplicate things. Weigh up the pros and cons of each option identified during your brainstorming session, and then rank them according to how well it addresses the root cause. Discuss and agree on the best option and ensure that you get complete buy-in from all relevant parties.

- **Define success & monitor results**

You need to be clear about how you will identify whether the problem has been resolved. Then monitor results on an ongoing basis to ensure that you are on track. If at any time you realize that your chosen solution has resulted in unexpected issues, or is not meeting your desired results, stop work immediately and go back to the drawing board.

# Self-check- 4

Name…… ID…… Date…….

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

Test I: Short Answer Questions (4. point each)

1. List the step process required for effective problem solving during analyzing. ---------
---
---

2. Explain each of them?

Answer Sheet

Score = _____

Rating: _____

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

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

# Information Sheet 5- Taking appropriate action

## 5.1. Introduction

**Problems** waste time and resources and fester into bigger headaches. Effective problem solving is critical to ensuring the ongoing performance of your company's operations. Often the best approach involves blending different strategies together to meet your unique organizational needs. Timely, it is necessary to find out the reason and take appropriate action. It is also important to check that the information sent in is accurate and complete. Operational issues are any kind of problem that arises which can render a business less profitable. Be cautious of investing in a solution that is new but irrelevant to operational needs. Prioritize your business goals to align with efficiencies on a multi-platform solution and approach. Remember what the customer needs and what is realistic in terms of delivering within operations.

### 5.2. Solving operational problem

When solving problems within operations, it is possible to do so partially and to have said problem manifest itself repeatedly with various mutations that would make us think we are dealing with multiple issues.

- **By completely and thoroughly resolving the core issue, we can accomplish two things:**

✓ Stop wasting resources dealing with problems from the same core issue and

✓ Create sustainable improvement in the organization.

In order to better solve problems, the operations team should be well trained and guided to find permanent corrective actions for the problems they encounter.

- **Five Keys to Effective Operational Problem-Solving:**

#### 1. Focus on Root Cause(s) and not Symptoms

It is very easy to focus on the symptoms that are most visible in the organization when trying to improve performance. Unfortunately, it's not enough to scream "Stop being late

with deliveries!" to resolve a delivery problem -- if it were, every executive would at some point have resolved the issue. Instead, we must ask "Why?" and drill down until the core root causes are identified. There can be one, multiple or interrelated root causes to any particular issue that manifest themselves in the operation.

**2. Turn-off All Root Causes**

If we only defeat one root cause of a problem that has multiple causes, the problem will re-establish itself shortly and perhaps change slightly so as to be considered a new or different problem. When we conduct our root cause analysis, we should identify all root causes and develop plans to turn off each one (or one of any given interrelated grouping) to make sure the problem never recurs.

**3. Don't Mistake Containment for Resolution**

As soon as an operational problem is discerned, it should be contained. Awareness should be raised and those affected should work together to identify a short-term strategy for making sure the problem doesn't escape the immediate area while permanent corrective actions are developed and verified. All too often, this temporary action can remain in place far too long while other more emergent issues are looked after. Instead, be certain to use the containment action to stop problems from becoming tragedies, but don't allow containment to remain past its welcome.

**4. Audit Results of Problem-Solving**

When a problem has been certified as "solved" within the operation, this should trigger periodic and scheduled assessment of resolution to ensure that it is truly fixed. A post-mortem should also be conducted to understand why the things that functioned properly were effective and why failures were ineffective. Brutal honesty and focus on process are essential to be effective in this endeavor.

**5. Don't Over-Adjust**

It can be a tendency of executives driving problem-solving activity to make immediate adjustments when they learn that, after a process has been changed to solve a problem, the problem re-emerges. Remember that occasionally the cycle-time to incorporate solutions is longer than the frequency of emergence. This means that, while the problem is being solved and the process modified, other problems may occur that escape the containment strategy particularly if all root causes are not yet understood. In this case, it is important to identify which problem manifestations occurred because of failed containment and which occurred because the new process is still faulty. Focus on root cause of the failure here is essential for final resolution.

By carefully solving the problems within our operation, we can consistently increase profitability and create more output with fewer resources. It's essential to do a great job of problem solving every time!

# Self-check- 5

Name…… ID…… Date…….

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

Test I: Short Answer Questions (4. point each)

1. Effective problem solving is critical to ensuring the ongoing performance of your company's operations. A. True B. False
2. By completely and thoroughly resolving the core issue, we can accomplish two things: ----------and ----------
3. List five Keys to effective Operational Problem-Solving: ----------
   ----------
   ----------

Answer Sheet

Score = _____

Rating: _____

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

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

| LG #16 | LO #4- Handover side by side utilities operations |
|---|---|

# Instruction sheet

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

- Maintaining workplace records
- Carrying out handover
- Making side by side utilities operator aware status

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**:

- Maintain workplace records, carry out handover and Making side-by-side utilities operator according work place procedure.

**Learning Instructions:**

3. Read the specific objectives of this Learning Guide.
4. Follow the instructions described below.
5. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
6. Accomplish the “Self-checks” which are placed following all information sheets.
7. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

# Information Sheet 1- Maintaining workplace records

## 1.1. Introduction

Records will be specified in the organization's record keeping processes and procedures and include one or more of the following:

- Hard copy, such as documents, images, reports and forms.
- Electronic, such as documents, images, reports, forms, databases and spreadsheets.
- Physical, such as samples of products or materials.

## 1.2. Requirement of recording work place information

Any record keeping system should be accurate, reliable, easy to follow, consistent as to the basis used and be very simple. Good record keeping is vital in regards to meeting the financial commitments of the business and providing information on which decisions for the future of the business can be based.

Records contain information that is needed for the day-to-day work of government and NGO. Their purpose is to provide reliable evidence of, and information about, 'who, what, when, and why' something happened. In some cases, the requirement to keep certain records is clearly defined by law, regulation or professional practice.

- **Process and maintain workplace information: -**

1. Collect information. In a timely manner and ensure that it is relevant to organizational needs.
2. Process workplace information. Use business equipment/technology to process information in accordance with organizational requirements.
3. Maintain information systems.

# Information Sheet 2- Carrying out handover

## Self-check- 1

Name…… ID…… Date…….

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

Test I: Short Answer Questions (3. point each)

1.write down the requirement of recording work place information:----------

---

---

2. Process and maintain work place information include ----------

---

Answer Sheet

Score = _____

Rating: _____

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

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

### 2.2. Over view of handover

**Handover** is a process not a date. Planning for it should be from the start of the project and it should be viewed as an incremental transfer of knowledge and operation from project team to business-as-usual. The benefits and deliverables must be measurable and communicable from the start. When are you leaving a position, it is likely that your manager or supervisor will ask you to help in the handover period to your successor. Being organized and proactive will help to ensure that your company has a smooth transition and you leave with an excellent professional reputation. Effective communication is important in all organizations when a task and its associated responsibilities are handed over to another person or work team.

### 2.3. Key principles in handover

To ensure safe handover, organizations should:

- Identify higher risk handovers;
- Develop staff's communication skills;
- Emphasise the importance of shift handover;
- Provide procedures for shift handover;
- Plan for maintenance work to be completed within one shift if possible.

✓ **Shift handover should be**:

1. Conducted face-to-face;
2. Two-way, with both participants taking joint responsibility;
3. Done using both verbal and written communication;
4. Based on an analysis of the information needs of incoming staff;
5. Given as much time and resource as necessary.

✓ **Improvements should also be made by:**

1. Designing support equipment, such as logs and computer displays, with consideration of the operator's needs;
2. Involving the end-users when implementing any changes to existing communication methods at shift handover.

## 2.4. Importance of handover

The goal of handover is the accurate reliable communication of task-relevant information across shift changes or between teams thereby ensuring continuity of safe and effective working. Effective handover consists of three elements:

- ✓ A period of preparation by out-going personnel;
- ✓ Handover where out-going and in-coming personnel communicate to exchange task-relevant information; and
- ✓ Cross-checking of information by in-coming personnel as they assume responsibility for the task.

Many accidents have occurred because of failure of communication at shift handover, the majority of these involved planned maintenance work. In the 1983 Sellafield Beach Incident, highly radioactive waste liquor was accidentally discharged to sea, due to a failure of communication between shifts. The Cullen Report concluded that one of the many factors that contributed to the Piper Alpha disaster was failure of information transmission at shift handover.

❖ **Handover Notes includes: -**

- A description of your daily tasks and processes.
- Key day-to-day activities.
- Access to all relevant spreadsheets and files.
- Project deadlines and status updates.
- A list of key contacts – customers, clients, stakeholders, managers.
- Any ongoing issues affecting projects.

On the other hands, performing a handover using the widely accepted and universally recognized. While handing over manufacturing operations involves:

- ✓ Preparation of area, equipment and materials for handover,
- ✓ Cleaning tools and equipment when required,
- ✓ Confirming the status of the area, equipment and materials for handover,
- ✓ Handing over of manufacturing operations,
- ✓ Completing any necessary documentation,
- ✓ Working in ways which maintain the safety of yourself and others

# Self-check- 2

Name…… ID…… Date…

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

Test I: Short Answer Questions (5. point each)

1. List the principle of hand over: ----------
2. Write down the element of effective hand over: ----------
   ----------
   -

Answer Sheet

| Score = _____ |
| --- |
| Rating: _____ |

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

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

# Information Sheet 3- Making side by side utilities

## 3.1. Introduction

Determined for operator effectiveness implies facing a number of significant challenges regarding both technology and management. For instance, managing and monitoring industrial processes is characterized by inevitable changes in technology, a diminishing knowledge base due to demographic changes in the workforce, and the ever-increasing complexity of operations. These factors may lead to huge cost escalations if operator effectiveness is not taken into account rigorously. Developing an effective HMI (human machine interface) needs to look at the operator's workflow and requirements. A recent survey on operator effectiveness shows that this view is also shared by many of ABB's customers.

- ✓ **Four pillars of operator effectiveness**

When designing an automation system, there are four main pillars affecting an operator's performance:

- Integrated operations
- Design for high-performance
- Attention to human factors, and
- Operator competence.

- ✓ **Integrated operations**

An effective control system should provide customers with the means to consolidate and rationalize data from various sources seamlessly. It achieves collaboration between different computer programs and systems, supplying operators with all necessary information from any number of sources. Operators have intuitive access to actionable information and can manage views dynamically and effectively. These features reduce the time required to identify necessary actions.

Today, an operating plant may include multiple controller platforms including PLCs (programmable logic controllers), DCSs (distributed control systems), safety systems, FASs (facilities automation systems), and ECSs (electrical control systems) to name

just a few. In addition, plant information systems such as CMMS (computerized maintenance management systems), ERP (enterprise resource planning), video monitoring systems, and data historians are also available and contain valuable information that can support operators in their decision making.

- ✓ **Design for high performance**

Many standards organizations and research institutes have made and continue to make valuable contributions to HMI philosophies. This knowledge has flowed into guidelines for interface design, ergonomics, situation awareness, and alarm management. Some of the key concepts that situation awareness reflects are color definitions and use to maximize visibility of abnormal situations. The situation awareness concept is not new. It is, however, still a matter of debate between multiple organizations. One aspect being debated is the use of grayscale or cool process graphic schemes. In addition, navigation methodology, graphic-level definition for fast response under abnormal conditions, and presentation of information are used to seek to predict and avert abnormal situations completely.

One good example of situation awareness as described in the “High Performance HMI Handbook” mentioned above concerns two graphics that both embed the same information but have totally different effects on situation awareness. A graphic with a black background and an abundance of colors leads to poor situation awareness even in normal situations, whereas the graphic with gray scales and the sharp color for alarm depiction represents good situation awareness.

- **Situation awareness can make a huge impact by:**

Increasing the success rate in handling abnormal situations and returning to a normal mode of operation

Reducing the time, it takes plant operators to complete required tasks during an abnormal situation, and

Raising the incidence rate of control room operators detecting an abnormal situation prior to alarms occurring.

- ✓ **Attention to human factors**

System designers need to address attention explicitly to human factors. One main reason is that a skilled designer knows that a better working environment can reduce an operator's stress, which in turn substantially increases the operator's performance and effectiveness for handling abnormal situations, as well as reduces health issues and turnover of resources.

Control room procedures are important to ensure consistency of operation. They can also support an operator in his or her activities that may be performed infrequently. An example of useful supporting mechanisms is the use of checklists to guide operators throughout the required procedures under specific circumstances.

Clear definition of job roles and responsibilities is another vital element that characterizes successful operations. This means that all the tasks an operator needs to perform should be recognized and documented, including the tasks that go beyond operating in the normal mode.

- ✓ **Operator competence**

When operators interact with processes, their actions often have huge business consequences, especially when the process is in an exceptional situation and operators need to understand and manage complex operations to support recovery. New technologies using simulators for advanced training can recreate the exact operator environment, including graphics and control logic. The simulator provides a safe and realistic environment in which process operators and instrument technicians can learn how to master the process and increase their confidence.

# Self-check- 3

Name…… ID…… Date…

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

Test I: Short Answer Questions (4. point each)

1. List the main pillars affecting an operator's performance: ----------
   ----------
   -
2. Explain ach of them?

Answer Sheet

Score = _____

Rating: _____

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

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

| LG #17 | LO #5- Carry out an operational shutdown |
|---|---|

# Instruction sheet

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

- Shutting down machines
- Identifying and reporting maintenance requirements
- Cleaning machines internally and externally

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

- Shut down machines according to workplace procedures and manufacturer's recommendations
- Identify and report maintenance requirements
- Clean machines internally and externally

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

# Information Sheet 1- Shutting down machines

## 1.1. Equipment shutdown

**Plant shutdowns**, also known as turnarounds, are one of the most critical times in the operation of a plant. Shutdowns have a profound ability to affect the plant's financial future in either a positive or negative way. A shutdown that is poorly planned exceeds its deadline, or goes past its budget can negatively influence the plant's bottom line. A plant turnaround that is well planned and executed can positively affect the plant and have it running within capacity for years. Industrial Shutdowns and turnarounds are construction projects that are often referred to as turnarounds or outages. On average shutdowns and turnarounds take from a few days to a few months.

When shutting down an equipment item for inspection or maintenance, the correct type of shutdown must be used and the Standard Operating Procedures for the appropriate shutdown must be strictly followed. During a shutdown, system checks should be made to ensure the shutdown proceeds safely. Normal 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.

- Typical checks during a shutdown could include:

  - ✓ Equipment cools down at a safe rate to prevent thermal fractures
  - ✓ The correct valve sequence is followed to depressurize and purge equipment and lines
  - ✓ Shutdown valves close at the appropriate time to isolate equipment from process flows and utilities
  - ✓ Lube oil pressure is maintained during the rundown period
  - ✓ Valve status is correct at the completion of the shutdown
  - ✓ All process flows are maintained at required values, by use of standby or alternative equipment.

Generally, a plant shutdown or turnaround is a temporary closure of a building to perform maintenance. The main activities should be preventative in nature with the focus on equipment inspections. This is the best time to replace worn-out or broken process materials and equipment at their useful end-of-life. When equipment, such as a water cooled pump, is shut down for maintenance or inspection you must be careful that you follow all of the steps in the Standard Operating Procedures.

- ❖ The following point are important during the shutdown:-

1. The coolant flow is maintained for a period of time after the pump is shutdown.
2. The lube oil pressure is reduced only after the pump has come to a complete stop.
3. The correct valves sequence must be followed for all process lines.
4. Upstream and downstream unit operators and utilities suppliers are informed before you proceed with the shutdown.

# Self-check- 1

Name…… ID…… Date…….

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

Test I: Short Answer Questions (3. point each)

1. Typical checks during a shutdown could include:
    1. ----------
    2. ----------
    3. ----------
    4. ----------
    5. ----------
    6. ----------
2. List important point should be considered during shut down:----------
---
---
-

Answer Sheet

Score = _____

Rating: _____

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

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

# Information Sheet 2- Identifying and reporting maintenance

## 2.1. Maintenance requirement

**Maintenance** is the process of maintaining something or somebody. It may mean the state of being maintained. The term also refers to looking after somebody financially, i.e., the provision of financial support of a person. Specifically, providing them with living expenses. Maintenance requirements are dependent on the size and type of mechanical equipment, transportation of equipment parts, as well as access requirements for tool and lifting clearances. The maintenance is carried out irrespective of the condition of the machinery. The parts have to be replaced if it is written in the schedule, even if they can be still used. In this system the maintenance is carried out when the machinery breaks down. This is the reason it is known as the breakdown maintenance. Some pieces of equipment in the workplace such as fridges, ovens, air conditioners or washing machines will each have their own instruction manual. These may help you in solving small problems before needing to call for professional outside specialist maintenance.

### 2.5. Types of maintenance

Based on the nature of the tasks there are five types of maintenance, which include:

- **Condition based maintenance**: is sometimes considered to be a more advanced alternative to preventive maintenance. Rather than being inspected according to a schedule, machines and systems are carefully observed for changes that could indicate upcoming failure.
- **Corrective maintenance:** is initiated when a problem is discovered while working on another work order. With corrective maintenance, issues are caught 'just in time.
- **Predictive maintenance**: refers to a specific type of condition-based maintenance in which systems are constantly observed via sensor devices.
- **Predetermined.** Is carried out using rules and suggestions created by the original manufacturer, rather than the maintenance team. These suggestions are based on experiments and gathered data.

- **Preventive maintenance.** Is aimed at catching and fixing problems before they happen. It is most commonly carried out in the form of regular inspections, usually occurring multiple times per year.

## 2.3. Reporting maintenance

The report shows maintenance details of each event in the time range, including the Setup/Takedown Time, Instructions, Event Time, Facility, Event, ID (Rental, Contract or Event), Service, and Customer. All maintenance operations included in the plan should fulfill the following 3 requirements: applicability, efficiency and profitability. An operation is applicable if it can be implemented; it is efficient if it significantly reduces failure rate and it is profitable if it improves production. Maintenance procedures are written instructions that, when followed by the maintenance personnel, will ensure that equipment operates as designed within safe operating limits.

### 2.5.1. Steps to Create a Maintenance Report in MS Word

1: Create the Cover Page. Open a new document in MS Word and **write** the title.

2: Cover Letter. On the next page include the cover letter.

3: Device Information.

4: New Parts Cost Details.

5: Suggestions and Signature.

# Self-check-2

Name…… ID…… Date…….

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

Test I: Short Answer Questions (5. point each)

1. Maintenance is the process of maintaining something or somebody. It may mean the state of being maintained.
A. True B. False

2. One of the following of is not type of maintenance

A. Condition based maintenance.
B. Preventive maintenance.
C. Corrective maintenance.
D. None

Answer Sheet

Score = _____

Rating: _____

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

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

# Information Sheet 3- Cleaning machines internally and

## 3.1. Identify cleaning and maintenance requirements

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

- ✓ Understand what is meant by cleaning
- ✓ Understand what is meant by maintenance Identify all areas that require cleaning, including front of house and back of house
- ✓ Identify all items that require cleaning
- ✓ Recognize different types of surfaces
- ✓ Understand the frequency of cleaning
- ✓ Identify and locate all instructions in relation to cleaning
- ✓ Understand a job schedule
- ✓ Locate task descriptions
- ✓ Locate the necessary maintenance and hazard request forms
- ✓ Locate all operating instructions for all cleaning equipment
- ✓ Read a trading roster and banquet schedule.

## 3.2. Cleaning machines

Cleaning is the removal of all visible soil in an approved way with the use of mechanical and chemical action or both, so that all areas are cleaned and sanitized to a high standard. Maintenance is the upkeep of all furniture, fittings and equipment to an exacting standard within the property so that all areas look consistently new and pristine. Cleaning is an investment in the assets of a building Maintenance is the upkeep of all furniture, fittings and equipment to an exacting standard within the property so that all areas look consistently new and pristine.

Remove liners and reline all waste containers. Change the bag when ¾ full or if the area is closed. Internally cleaning of machine will be done pour a quart of white vinegar into the wash drum with a cup of baking soda. Use a stiff nylon brush and vinegar to scrub the interior of the wash drum. At the hottest temperature setting, run a wash cycle with this cleaning solution in an empty washer, select the heavy-duty wash cycle if available.

# Self-check-3

Name…… ID…… Date…

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

Test I: Short Answer Questions (4. point each)

1. List the Identify cleaning and maintenance requirements
   A----------
   B.----------
   C.----------
   D.----------
2. Write down the steps of clean industrial work equipment:
   ---
   ---
   ---

Answer Sheet

Score = _____

Rating: _____

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

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

## Operation Sheet 1- Clean industrial work equipment

The following steps is provided for clean industrial work equipment

- Assess suitability of equipment for cleaning
- Select appropriate cleaning equipment and chemicals
- Select the protective clothing and equipment to be used
- Prepare equipment for cleaning
- Clean equipment as identified
- Tidy work site
- Dispose of waste
- Clean, check and store cleaning equipment and chemicals

| LAP TEST | Performance Test |
|---|---|

Name……. ID……..
Date…….

Time started: _____ Time finished: _____

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within1/2hour. The project is expected from each student to do it.

**Task-1** Operate cleaning industrial work equipment

# Reference


Alexander, D.e. (2002): Principles of Emergency Planning and Management. Terra
ASHRAE Guideline 4: 1993. Preparation of Operating and Maintenance Documentation for Building Systems. Atlanta.
Ben-Ishai, Liz. 2015. “Volatile Job Schedules and Access to Public Benefits.” Washington, DC: Center for Law and Social Policy. http://www.clasp.org/sites/default/files/publications/

BENSON, C. & CLAY, E. J. (2002): Disasters, Vulnerability and the Global Economy. Draft paper for the conference: ‘The Future of Disaster Risk: Building Safer Cities’,
Bo Kyeng Bou *et al* (2001) an operating procedure synthesis method for shutdown of boiler plants.
Burton, T., Kates, R. W. & White G. F. (1993): The Environment as Hazard, 2nd ed. Guildford Press, New York and London.
CANNON, T. (1993): A hazard need not a disaster makes: vulnerability and the causes of ‘natural’ disaster. In: Natural Hazards, P.A. Merriman, and C.W.A. Browitt, (Eds.).
Environmental, Health, and Safety Guidelines, 2007
Falk, Gene, Maggie McCarty, and Randy Alison Aussenberg. 2014. “Work Requirements, Time Limits, and Work Incentives in TANF, SNAP, and Housing Assistance.” Washington, DC: Congressional Research Service. https://greenbook-

GARDENIER, J; KEEY, R. B. (1992): Risk Assessment of Industrial and Natural Hazards, Centre for Advanced Engineering, University of Canterbury, 1st ed.: 191p.
Gardner EP, Martin JH. Coding of sensory information. In: Kandell ER, Schwartz JH, editors. McGraw Hill; 2000. Principles of neural science, 4th edition. New York: p. 411-29.
Gehr, Jessica. 2017. “Doubling Down: How Work Requirements in Public Benefit Programs Hurt Low-Wage Workers.” Washington, DC: Center for Law and Social Policy.

Government of South Australia, 2017. Cleaning Standards for Healthcare Facilities.

Helmi A. Youssef and Hassen El-Hofy, “Machining technology, Machine tools and operations”, Taylor & Francis Group, Boca Raton, London, New York, 2008.
http://www.fs.fed.us/sustainableoperations/
Lakshmanan, R. and G. Stephanopoulos (1990). Synthesis of operating procedures for complete chemical plants-lll: planning in the presence of qualitative, mixing constraints. *Comput. Chem. Eng.,* 14(3),301-317.
Outka-Perkins, Lisa. 2011. Utility-Terrain Vehicle Operator Training Course: Instructor’s Guide.
Publishing, Harpenden, pp 340.

Rohe, William Michael D. Webb, and Kirstin P. Frescoln. 2016. “Work Requirements in Public Housing: Impacts on Tenant Employment and Evictions.” Housing Policy Debate 26 (6): 909–27

Saab, C.; Shahrour, I.; Hage Chehade, F. (2019) Risk Assessment of Water Accidental Contamination Using Smart Water Quality Monitoring. Expo Health
Washington DC, December 2002.
Wiley Periodicals, (2009) Human Factors and Ergonomics in Manufacturing, Vol. 19 (2) 168–176.

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