Cereal Processing

Level-II

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Module Title: Conducting Routine Maintenance

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LG #66	LO #1: Conduct routine inspection of plant and equipment

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Inspect equipment to identify signs of wear. • Assessing nature of maintenance requirement 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: • Inspect equipment to identify signs of wear • Assessing nature of maintenance requirement
Learning Instructions: **1.** Read the specific objectives of this Learning Guide. **2.** Follow the instructions described below. **3.** Read the information written in the information Sheets **4.** Accomplish the Self-checks **5.** Perform Operation Sheets **6.** Do the “LAP test”

Information Sheet 1- Inspect equipment to identify signs of wear

1.1 Introduction

This sheet applies **inspections to flour mill, bakery and packaging equipment to identify signs of wear**. Prior to conducting inspections involving any product manufacturer, review the general inspectional instructions such as establishment inspections, particularly food inspections. Besides, do not conduct flour mill inspections without first receiving on-site training. Especially, at the start of the inspection, prior to entering any equipment, collect and examine cleaned and un-cleaned raw materials (wheat, maize, rice, etc) and correlated flour samples as instructed below:

1.2 Inspection

Inspection is an "observations of work environment, work practices, equipment used, work posture or reported hazard that may be done with or without an inspection checklist". The inspection may be generic or it may be specific to assess a particular risk, task or part of the occupational health and safety management system. **Examples of independent inspection processes include: Inspection of a**

- Potentially hazardous process to ensure that controls have been effective
- Plant such as pressure vessels to check they conform with specified standards and regulatory requirements
- Work area to ensure that specific site safety rules have been followed or to identify hazards
- Work site to ensure that controls are effective and to reinforce management commitment to the corporate and local occupational health and safety management system.

The purpose of an inspection is to identify whether work equipment can be operated, adjusted and maintained safely – with any deterioration detected and remedied before it results in a health and safety risk. Not all work equipment needs formal inspection to ensure safety and, in many cases, a quick visual check before use will be sufficient.

However, inspection is necessary for any equipment where significant risks to health and safety may arise from incorrect installation, reinstallation, deterioration or any other circumstances. The need for inspection and inspection frequencies should be determined through risk assessment

1.3 Terminologies and definitions

A machine is a device with a specific mechanism in it to perform a specific task or tasks with certain mechanical advantage.

Equipment is defined as any utensil or machine used or capable of being used in the cleaning of any equipment or facilities. In detail, it is the whole or any part of any utensil, machine, fitting, device, instrument, stamp, apparatus, table, or article, that is used or available for use in or for the preparing, marketing, processing, packing, storing, carrying, or handling of any material, animal product, ingredient, additive, or processing aid; and others.

Good operating practice means documented procedures relating to practices that are:

- required to ensure products are fit for their intended purpose; and
- appropriate to the operating circumstances

Tailings (or overs) are Material which does not pass through the first sieve screen of a sifter.

Pre-break or break roll are rolls used to break wheat kernels, beginning the flour milling process. They consist of a pair of grooved, steel rolls rotating in opposite directions. One roll turns about 2 1/2 times faster than the other.

Reduction rolls are smooth, steel rolls used to reduce the size of the endosperm particles or middlings (midds).

Purifiers are recripocating sieves using air currents to separate bran and classify particles

Boot trier is a long, rectangular, shallow scoop that is used to sample grain from the inspection port of the boot of a bucket elevator. **Note: never use the trier in an elevator that is operating.** Material from a boot trier is examined by slicking or sieving.

Dockage sieves are set of #10 mesh, #20 mesh, #30 mesh sieves, and a bottom pan, used to sift grain or flour for insect contamination.

Flour slick is a wide stainless steel spatula used by passing the flat side of the tool through the material being examined. This spreads and compresses the material, and insects or other foreign objects in will pop to the surface of the "slicked" material.

Internal audit (or internal verification audit) means a systematic examination of inspection processes/procedures to ensure compliance to requirements:

- By obtaining factual evidence (e.g. Records, visual inspection reality check, etc.); and
- Carried out by an independent/ impartial suitably skilled auditor.

Label includes any wording, tag, brand, symbol, picture, or other descriptive matter written, printed, stenciled, marked, embossed, impressed on, appearing on, attached to, or enclosed within any animal material or animal product

Maintenance compound is any substance**:**

- used for maintaining, repairing, servicing, cleaning, or sanitizing equipment or surfaces that may be the source of, or result in, contamination of cereal processing product or associated things;
- used for treating water; or
- used for pest control

Testing is taken to mean: "use of standardized tests to check equipment, plant operation, process control, performance and effectiveness". For example fume cupboard face velocity test.

Monitoring refers to work environment monitoring or biological monitoring of individual employee's occupational health/exposure.

Monitoring records include

- visual and other sensory assessment of equipment and the environment,
- documented checks of the supporting systems in action

Non-complying (non- compliance) means any equipment or product or input that fails to comply with regulatory requirements.

Non-conforming (non-conformance) means any material or product or input that is suspected or known not to meet operator defined limits/criteria

Operator verification means the application of methods, procedures, tests and other checks by inspector to confirm the ongoing.

Conveying system equipment are devices used in elevators, mills and manufacturing plants to move materials from one site or point to another. Common pieces of equipment include:

- **Conveyor Belts** are wide, open rubber or composition belts moving at relatively high speeds. They are used primarily in elevators to convey whole grain from one bin to another, in unloading trucks and railcars, or loading ships.
- **Boots** (bottoms of bucket conveyors) are the drop-bottom type of boot cannot be examined internally while the mill is in operation. Some boots are mounted slightly above the floor, making the area underneath hard to clean. Examine stock under the boot which may serve as a source of contamination for the whole conveying system. Open slightly and note if the stock is loosely or tightly packed. If tightly packed, the boot has not been disturbed for some time.

- **Heads** (tops of bucket conveyors) - Examine static stock which has collected on ledges within the heads. If the heads themselves cannot be entered, examine static stock in spouts as near to the heads as possible.
- **Spouts** - Inspect spouts through inspection ports and examine static stock on the undersides of the port covers, felting if used, and debris under metal lining in spouts.
- **Screw conveyors** - Where there are many conveyors, concentrate on the longer ones. Examine static stock in screw conveyors not covered under specific mill equipment listed elsewhere. Special attention should be directed to conveyors which have been sealed against entry, dead stock at the ends, and to conveyor(s) moving flour from bulk storage.
- **Elevator** (legs) - Examine through port openings. Check port lids for presence of insects, larva and webbing.
- **Millerator -** A separator used as an initial cleaning step to remove coarse and fine materials from the grain stream.

1.4 Inspection of flour production equipment

Use caution when examining any of this equipment while in operation, both to protect your-self as well as the equipment. Except in a small mill, it may not be feasible to

examine all equipment, but some of all types of equipment should be examined. Also look for lubricant and heat transfer fluid leaks. The equipment may be considered in seven categories, as follows:

1.4.1 Rolls

Examine static stock in the feeder box, on ledges in upper housing, in the housing beneath the rolls, and in the corners of the hopper itself.

1.4.2 Sifters

Examine static stock as far up and down from the spout opening as possible. Square spout openings usually contain ledges within the spout. Examine felt gaskets or packing, and tailover stock from rebolt sifters. If insects are found, examine the systems ahead of the rebolt.

1.4.3 Purifiers

Examine static stock in the feeder box, on ledges in the upper and lower housing, and the sieve to see whether or not insects are tailing over. Examine the tailover spout and static stock at the end of the conveyor.

1.4.4 Conveying system

Examination of conveying system components is addressed in the introduction to this guide. Common components include boots (during inspection of flour mills always examine the boots which handle the first and second tailings and the sixth or seventh midds), heads, spouts, screw conveyors (special attention should be directed to conveyors which have been sealed against entry, to dead stock at the ends, and to conveyor moving flour from bulk storage), and elevators.

1.4.5 Suction trunking

Dust collected from the break and reduction rolls, purifiers, and sifters are almost always processed into flour, and if infested, serves to contaminate the equipment beyond the point of entry of these dust streams into the flour stream. Examine at elbows and dead ends or wherever there are accumulations of dust.

1.4.6 Dust collectors

Examine stock discharged from these collectors for insects particularly where static stock in corresponding suction trunking is found infested. The stocking-type dust collector is more difficult to clean than other types, particularly when infested by moths. A slight blow with the hand on a cyclone dust collector usually serves to dislodge static stock from the inside.

1.4.7 Bran and shorts dusters

Obtain entry to some of the bran and shorts dusters, and examine static stock from the housing and the spouts beneath.

1.4.8 Additional flour mill equipment to be inspected

- ✓ Flour slick,
- ✓ Boot trier,
- ✓ Industrial safety-type flashlight,
- ✓ Three sieves (#10, #20, and #30), and
- ✓ A deep-bottom pan.

1.5 Bakery products, dough, bakery mixes

Review Investigations Operations Manual 530 and 21 Codes of Federal Regulations 136, Bakery Products Standards, prior to conducting bakery inspections.

1.6 Packaging equipment

Wooden packer bins, including those with metal liners, should be examined for crevices, shoulders, and braces which could hold static stock and harbor insects. Infestation in packer bins is almost certain to produce identifiable filth in packaged flour. Some packaging machines are designed to allow a space between the bottom of the bin and the top of the packer. This space may be caulked with bags, or a cloth sleeve and if not properly cleaned may provide a harborage for insects.

When flour is removed from bulk storage tanks to be blended or packed, it may become contaminated by the passage through infested conveying equipment. Examine the blending equipment for dead ends, static stock in conveyors, spouts, etc. If any flour is being rebolted (sifted) after storage in bulk, examine the rebolt tailings. Report the type of sifter and the size of the cloth or wire with which this machine is clothed.

Packaging has to be sturdy, attractive, economical and yet non-toxic. It must act as a physical barrier to protect food from contamination and must also preserve the nutrients through avoiding interaction of food with oxygen, carbon dioxide and humidity. Besides these the important properties of packaging material are their physical, chemical, biological and thermal stability, impermeability to liquids and special properties like X-Ray resilience. The recommended packaging materials for consumer packs are as follows:

- Linear low density polyethylene
- High molecular high density polyethylene
- Biaxially oriented polypropylene film
- Polyethylene film
- Co-extruded films
- Laminate

1.6.1 Polyethylene film

Low density polyethylene (LDPE) is the most commonly used packaging material for milled products owing to its low cost and easy availability. LDPE film has good balanced property such as tensile strength, bursting strength, impact resistance and tear strength. It has good barrier properties to water and water vapour. It can be heat sealed very easily and gives good tough welds. The film can also be printed very easily. However, it has poor barrier to gases.

1.6.2 Linear low density polyethylene

Linear low density polyethylene (LLDPE) is a superior material than LDPE. Comparative properties of LLDPE and LDPE are given below to highlight the advantages of LLDPE.

- ✓ Improved tensile properties: For products with similar melt flow index, the tensile strength of LLDPE is 50-60% higher.
- ✓ Improved stiffness: Strength of LLDPE is 50% higher than that of LDPE.

- ✓ Puncture resistance: Puncture resistance of LLDPE film is twice as much as that of LDPE having similar thickness.

Table1. Properties of LDPE and LLDPE films comparative

Properties		ASTM Test Method	LLDPE Film	LDPE Film
Basic Density (g/cc)		D-792	0.925	0.923
Elmendorf Test Strength (g)	MD TD	D-1922 D-822	280 400	130 230
Tensile Strength (Psi)	MD TD	D-882	3240	2560 1980
Elongation (%)	MD TD		640 680	390 510
Gloss at 45° (%)		D-2457	80	83
Haze (%)		D-1003	6.4	4.0

Owing to better physical characteristics of LLDPE films, LDPE has now been replaced by LLDPE in number of cereal products applications. Thickness of LLDPE film used for different consumer packs is as follows:

- ✓ 1kg Pack-250 gauge
- ✓ 2kg Pack-300 gauge
- ✓ 5kg Pack-400 gauge White opaque film gives better aesthetics.

1.6.3 High molecular high density polyethylene

This material is characterised by its toughness and high mechanical strength. The film prepared out of this material is translucent and it can be modified by addition of pigments. The films have very good strength and are thus used in very low thickness for packing of cereal products. The film being tougher, insect penetration is difficult.

1.6.4 Co-extruded Films

Milled products like wheat flour contain small amount of fat which tend to ooze out through the LDPE or LLDPE film giving a sticky fat to the surface of the pack and also affecting the print of the film. It is therefore advantageous to use co-extruded film whereby a thin layer of HDPE/HMHDPE can be incorporated to prevent fat seepage.

Three layer co-extruded film having structure LDPE/HDPE/LLDPE is found useful in overcoming this difficulty. Use of metallocene resins in the above structure was found to produce a film having good weldability and high hot tack. As Atta is a powdery product, fly-off of the product is observed during filling the packs. The powder which flys off gets deposited in the seal area thereby affecting the strength of the seal. The metallocene resin helps in producing good seal along contaminated area. The above structure of co-extruded film using metallocene resin is, therefore, a very effective packaging material for milled products like Atta

1.6.5 Polypropylene (PP)

Polypropylene finds wide application in packaging of food products, like atta, soji etc. owing to its following properties:

- ✓ Density: Polypropylene has very low density among the commonly used plastics due to which it gives higher yield {meterage of film per kg for material} as compared to LDPE or LLDPE.
- ✓ High stiffness and High Tensile Strength.
- ✓ High Transparency: Polypropylene has very high transparency as compared to LDPE and LLDPE. It is the most suitable material for products, which require visibility.
- ✓ Lower moisture vapour transmission rate
- ✓ Cost: One of the advantages of PP is its low cost as it can be used at lower thickness owing to its high tensile strength. This is a big advantage for low cost, bulky products like Atta.

1.6.6 Biaxially oriented polypropylene film

Biaxially Oriented Polypropylene film **(BOPP)** has higher strength than polypropylene film and it is available in a heat sealable grade also. It has excellent barrier to moisture, high transparency and gloss. It can be reversing printed and can be laminated as a two-layer film. Heat sealable BOPP film with thickness ranging from 2µ to 40µ is widely used for packaging of cereals.

1.6.7 Laminates

Laminates made of BOPP/LDPE or Polyester/LDPE is used for packaging of milled cereal products. The advantages of laminates are as follows:

- ✓ Polyester and BOPP based laminates can be reverse printed thus giving good appearance to the pack. As the printed side of the film is sandwiched between two film layers, the odour due to ink solvents appearing into the pouch is prevented thereby protecting the product from tainting.
- ✓ Polyester being a tough material, insects cannot puncture the pouch easily and hence the entry of insects can be controlled.
- ✓ Cereal products are mostly sold through grocery outlets. The grocer sells many other items like soaps and detergents, incense sticks, strong smelling deodorants, vegetable oils. It has been observed that the grocer displays the consumer packs by placing them next to strong smelling items like soaps, incense sticks etc., as a result, the products packed inside the LDPE pack pick up the odour of the material stored in its vicinity. This problem can be overcome by using laminates with polyester/poly structure.
- ✓ As the laminates are expensive, they are mostly used for packing high value products.

It is therefore evident that the types of packaging material to be selected for cereal based products depends on various factors mentioned above and the packaging technologist should combine these factors to suit the requirements of product to be packed and arrive at a cost effective packaging system. The packaging materials mentioned above are the primary packaging materials for milled products.

Plastic Pouches for 1 kg Branded Rice

Plastic Pouches for Atta

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 (4 point)

1. One of the following is not additional flour mill equipment to be inspected?

   A. Flour slick B. Boot trier C. Three sieves D none of the above

2. Which one of the following is the purpose of packaging?

   A. Protect the product B. Store the product C. Carry nutritional information

Test II: Short Answer Questions

1. Define inspection (2 point).
2. Write down four advantages of laminates (5 point).
3. List down the appropriate packaging materials (5 points)

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

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

Information Sheet 2 - Assessing nature of maintenance required

2.1 Introduction

In order to **ensure work equipment** does not deteriorate to the extent that it may put people at risk, employers, the relevant self-employed and others in control of work equipment are required by provision and use of work equipment regulations to keep it 'maintained in an efficient state, in efficient order and in good repair'.

2.2 What required maintenance?

Work equipment is any machinery, appliance, apparatus, tool or installation for use at work (whether exclusively or not). This includes equipment which employees provide for their own use at work. The scope of work equipment is therefore extremely wide. The use of work equipment is also very widely interpreted and means any activity involving work equipment and includes starting, stopping, programming, setting, transporting, repairing, modifying, maintaining**,** servicing and cleaning'.

2.3 Full functional equipment

Provision and use of work equipment regulations requires that **standardized equipment** provided for use at work be:

- Suitable for the intended use
- Safe for use, maintained in a safe condition and inspected to ensure it is correctly installed and does not subsequently deteriorate
- Used only by people who have received adequate information, instruction and training
- Accompanied by suitable health and safety measures, such as protective devices and controls. These will normally include emergency stop devices, adequate means of isolation from sources of energy, clearly visible markings and warning devices
- Used in accordance with specific requirements, for mobile work equipment and power presses

2.4 Nature of maintenance assessment

The frequency and nature of maintenance should be determined through risk assessment, taking full account of:

- The manufacturer's recommendations
- The intensity of use
- Operating environment (eg the effect of temperature, corrosion, weathering)
- User knowledge and experience
- The risk to health and safety from any foreseeable failure or malfunction

The manufacturer's instructions should describe what maintenance is required to keep the equipment safe and how this can be done safely. These instructions should always be followed, unless there are justifiable reasons for not doing so (eg where more frequent maintenance is necessary, due to intense use, adverse environmental conditions or when other experience shows this need)

2.5 The importance of equipment maintenance

An effective maintenance program will make plant and equipment more reliable. Fewer breakdowns will mean less dangerous contact with machinery is required, as well as having the cost benefits of better productivity and efficiency. Additional hazards can occur when machinery becomes unreliable and develops faults. Maintenance allows these faults to be diagnosed early to manage any risks. However, maintenance needs to be correctly planned and carried out. Unsafe maintenance has caused many fatalities and serious injuries, either during the maintenance or to those using the badly maintained or wrongly maintained/repaired equipment.

2.6 Returning equipment to use (including re-commissioning equipment)

- Document a procedure to ensure that equipment returned to use (i.e. after repairs and maintenance, re-commissioning or having previously been idle) is not a source of contamination to the product.
- Ensure the procedure includes steps to:
  - ✓ thoroughly clean and sanitize equipment before being returned into a processing or support area;

- ✓ revalidate previously validated equipment if the repairs and maintenance activity may affect its validation status; and
- ✓ perform a pre-operational check before processing re-commences.

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 : Short Answer Questions

1. What is fully functional equipment? (5 points)
2. What required maintenance? (5 points)

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

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

LG #67	LO2 - Prepare to conduct routine maintenance

Instruction sheet

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

- Assesse maintenance task to determine tools and required services
- Preparation of equipment for maintenance
- Selection of hand tools according to task requirements
- Checking tools before use and report unsafe items within standard Procedures.
- Conducting work in accordance with workplace information.
- Plan and schedule maintenance with affected work areas

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**:

- Assesse maintenance task to determine tools and required services
- Prepare equipment for maintenance.
- Select of hand tools according to task requirements
- Check tools before use and report unsafe items within standard Procedures.
- Conduct work in accordance with workplace information.
- Plan and schedule maintenance with affected work areas

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- Assesse maintenance task to determine tools and required services

1.1 Introduction

This sheet defines the requirements for the content and format of Maintenance Task Identification and Analysis (MTI&A) to be used as a basis for subsequent preparation of Organizational and Intermediate level Job Performance Aids (JPA) called Job Guide Manuals (JGM) and Logic Tree Troubleshooting Aids (LTTA), as well as other types of technical manuals. As used in this specification **"maintenance task identification,**" also referred to as "task identification," means the ascertainment and itemization of the **troubleshooting tasks** required to maintain a system, subsystem, or equipment at the Organizational and Intermediate levels. "Maintenance task analysis," or "task analysis," means the analysis of the identified task to determine what the task consists of, what is needed to perform it, and how it should be performed. The * end results of the identification and analysis efforts, as well as certain intermediate stages of development, are recorded in a manner that will permit the information to be:

- Easily understood and applied during the Job Performance Aid preparation phase;
- To be checked for accuracy and adequacy; and
- To be updated as needed**,**

1.2 Maintenance task identification requirements

The initial step of the **maintenance task identification and analysis** shall be the identification of all troubleshooting and non-trouble shooting tasks required to be performed on the equipment at the Organizational and/or intermediate levels, as specified in the contract. The bases for the identification shall be an equipment breakdown and a list of all periodic, preventive and corrective maintenance tasks applicable to the equipment. Once the equipment and its assemblies, subassemblies, sub-subassemblies, and significant parts have been identified and listed, the appropriate tasks shall be assigned to each item at the proper maintenance level. A determination shall then be made of the tasks to be included in a Job Guide Manual or Logic Tree Trouble shooting Aids. The results shall be documented in the form of a matrix, called a Task Identification Matrix.

1.3 Basic task identification matrix

The basic task identification matrix (examples are shouwn in Figures 2 and 3) shall be prepared in accordance with the following requirements:

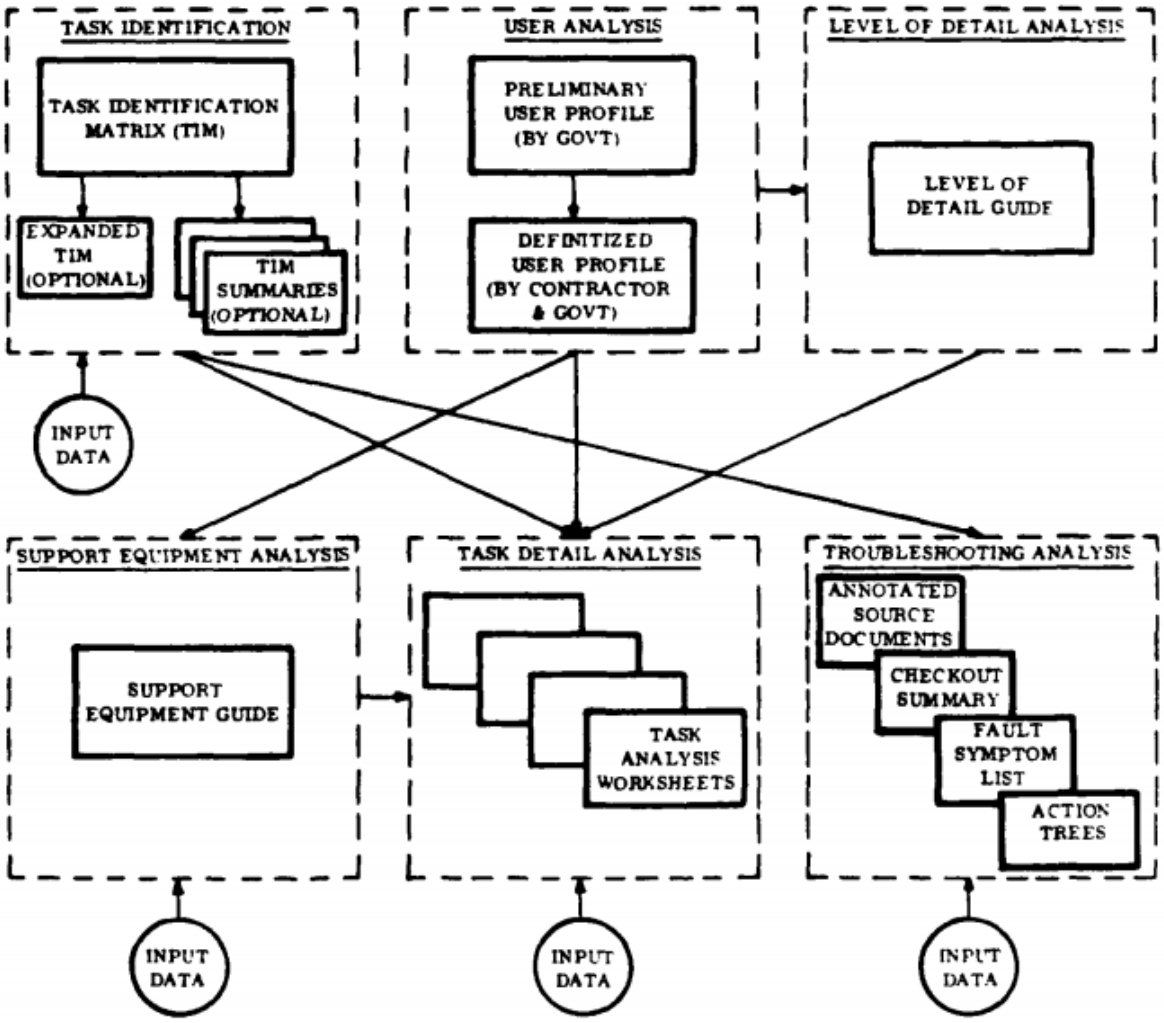
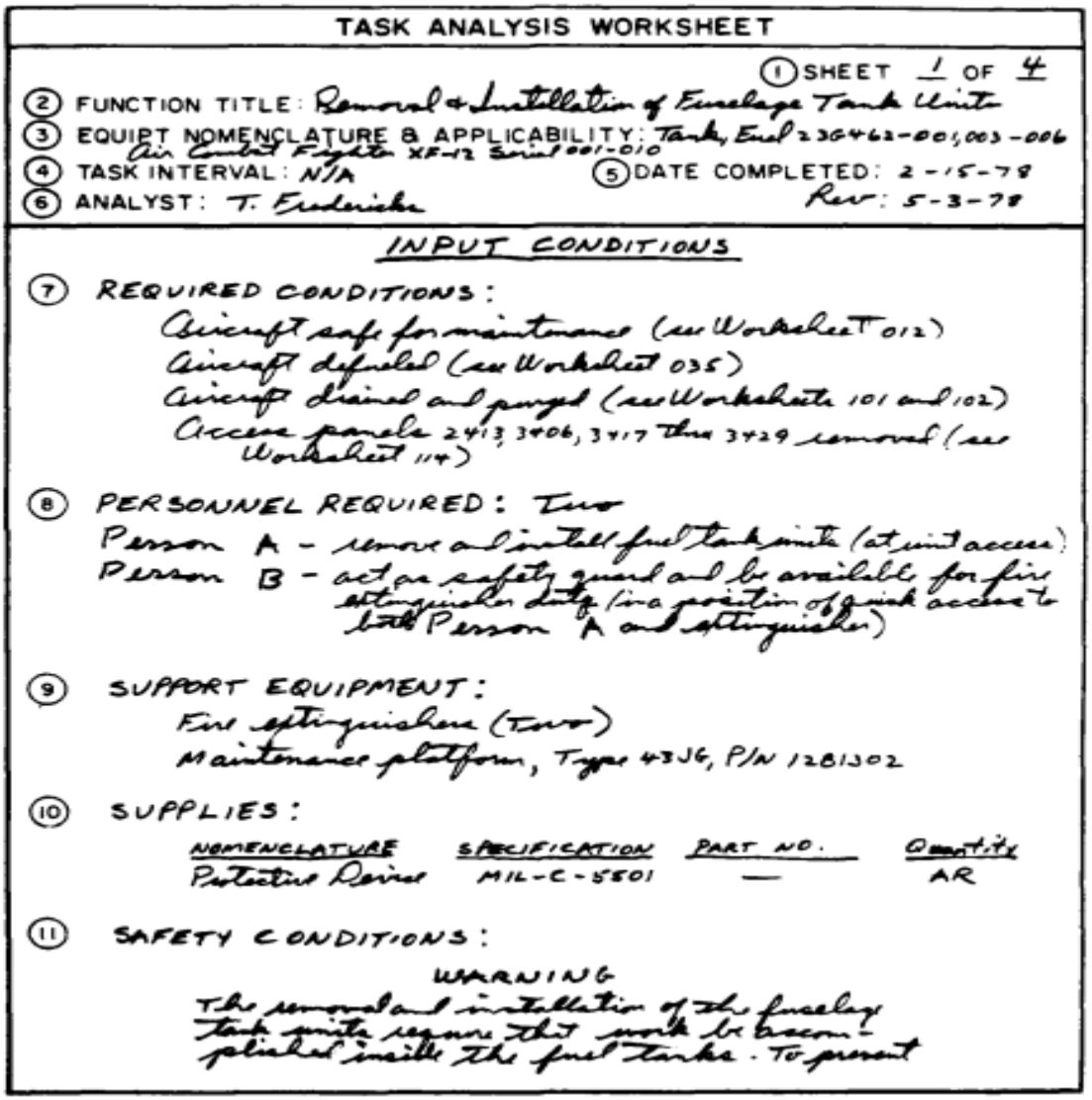


Figure 1. Maintenance Task Identification & Analysis relationships

CODE	PART NO.	DESCRIPTION		1 ADJUST	2 ALIGN	3 CALIBRT	4 CHKOUT	5 CLEAN	6 DIS/AS	7 LUBCTE	8 REM/IN	9 REPAIR	10 TSHOOT	DIAGNSTC	NOTES
				MAINTENANCE FUNCTION											
0201010147	0905743-0001	CABLE ASSY,W46	1	-	-	-	-	I	-	-	I	1/J	1/L	-	
0201010148	0905744-0001	CABLE ASSY,W47	1	-	-	-	-	I	-	-	I	I	1/L	-	RPR INCL IN W46
0201010149	0905745-0001	CABLE ASSY,W48	1	-	-	-	-	I	-	-	I	I	1/L	-	
0201010150	0905746-0001	CABLE ASSY,W49	1	-	-	-	-	I	-	-	I	I	1/L	-	
0201010151	0905747-0001	CABLE ASSY,W50	1	-	-	-	-	I	-	-	I	I	1/L	-	
0201010152	0905748-0001	CABLE ASSY,W54	1	-	-	-	-	I	-	-	I	I	1/L	-	
0201010153	0905807-0001	CABLE ASSY,W60	1	-	-	-	-	I	-	-	I	I	1/L	-	
0201010154	0919725-0001	CHOKE ASSY	1	-	-	-	-	I	-	-	0/J	1/J	-	-	
0201010155	0919736-0001	FAN ASSEMBLY	1	-	-	-	0/A	I	-	-	0/J	-	-	-	DWG NOT AVAILABLE
020102	0903845-0001	LEFT FILM TRANS	1	0/J	0/J	-	0/J	1/J	1/J	1/J	0/J	1/J	-	-	
02010202	0903862-0001	DRIVE MTR ASSY	1	0/J	0/J	-	0/A	I	1/J	1/J	0/J	1/J	-	-	
02010203	0903862-0002	DRIVE MTR ASSY	1	0	0	-	0	I	I	I	0	I	-	-	INCL IN 0001
020103	0903846-0001	FILM TRANSPORT	1	0/J	0/J	-	0/A	1/J	1/J	1/J	0/J	1/J	-	-	
020104	0903849-0001	DIRECT VIEW ASY	1	0/J	-		1/J	0/J	I	1/J	0/J	1/J	-	-	CLEAN I & O
02010401	0903951-0001	LID ASSY DIRECT	1	-	-	-	I	I	I	1/J	0/J	1/J	-	-	
02010402	0903992-0001	CURSOR DRIVE AS	1	-	-	-	1/J	0	1/J	1/J	0/J	1/J	-	-	CLEAN I & O
0201040201	0903886-0001	CURSOR ASSY	1	1/J	0/J	-	1/A	0	1/J	1/J	0/J	1/J	-	-	CLEAN I & O
0201040202	0905328-0001	CABLE ASSY CURS	1	-	-			I	-	-	0/J	1/J	1/L	-	
0201040203	0905751-0001	WIRING HARNESS	1	-	-		-	I	-	-	0	1/J	-	-	
0201040204	0911515-0001	MOTOR	2	-	-		-	1/J	1/J	1/J	0/J	1/J	-	-	
0201040205	0911516-0001	CABLE	1	-	-			I	-	-	0	I	I	-	INCL IN 0905328
0201040206	0919760-0001	FLYWHEEL MOTOR	1	-	-			-	-	-	1/J	-	-	-	
02010403	0905399-0001	LAMP TRAY ASSEM	1	-	-		1/A	I	1/J	-	1/J		1/A	-	
0201040301	0905573-0001	LAMP TRAY	1	-	-		-	0/J	-	-	I	-	-	-	CLEAN I & O
0201040302	0905781-0001	WIRING HARNESS	1	-	-			I	-	-	1/J	1/J	-	-	
02010404	0905732-0001	CABLE ASSY,W15	1	-	-		1/L	I	-	-	1/J	1/J	1/L	-	
020105	0903850-0001	STEREOSCOPE CAM	1	-	1/J		0/A	0	-	-	0/J	1/J	-	-	
020106	0903851-0001	LF CNTRL PANEL	1	0	0		1/A	I	1/J	-	1/J		-	-	
02010601	0904204-0001	FILM ASSY	2	-	-			-	-	-	0/J		-	-	
02010602	0904873-0001	SYNCHRONIZER	1	-	-			-	-	-	I	-	-	-	
02010603	0905344-0001	TERM BD ASSY	1	-	-			-	I	-	0		-	-	LIMITED I REPAIR
02010604	0905416-0001	TERM BD ASSY	1	-	-			-	I	-	0		-	-	LIMITED I REPAIR
02010605	0905823-0001	WIRING HARNESS	1	-	-			I	-	-	1/J	-	-	-	
02010606	0911538-0001	TERM BD	1	-	-			-	I	-	0		-	-	LIMITED I REPAIR
020107	0903852-0001	RIGHT CONTROL P	1	0	0	-	1/A	I	1/J	-	1/J	1/J	-	-	
02010701	0905345-0001	TERM BD STICK	1	-	-			I	-	-	0		-	-	
02010702	0905346-0001	TERM BD ASSY	1	-	-			I	-	-	0		-	-	
02010703	0905747-0001	WIRING HARNESS	1	-	-			I	-	I	1/J	1/J	-	-	
020108	0903853-0001	POWER DIST ASSY	1	-				1/J	-	-	0/J	-	-	-	MNR ORG LEVRTV/INS
02010801	0905111-0001	RETAINER ASSY	1	-					-	-	I	I	-	-	
02010802	0905204-0001	CONTROL REG	1	-					-	-	1/J	-	-	-	
02010803	0905265-0001	CHASSIS	1									-	-	-	DELETE
02010804	0905534-0001	PANEL ASSY	1	0/J	1/J	1/J		0	-	-	1/J	-	-	-	MNR ORG LEVRTV/INS
02010805	0905419-0001	LAMP TERM ASSY	1	-				I	-	-	1/J	-	-	-	
02010806	0905546-0001	HOUSING ASSY	1					I	-	-	I	-	-	-	
02010807	0905584-0001	VOLTAGE TOLERAN	1					I	-	-	1/J	-	1/L	-	
02010808	0905477-0001	CONTROLLER	1					I			0		-		
02010809	0905792-0001	WIRING HARNESS	1					I			I				
020109	0903857-0001	FILM TRANSPORT	1					I	I	I	I	I	-	-	
02010901	0905115-0001	HDWG TRANSPORT	1												

Figure 2. Example of basic task identification matrix - computer printout



TASK ANALYSIS WORKSHEET

(1) SHEET 1 OF 4

(2) FUNCTION TITLE: Removal & Installation of Fuselage Tank Units

(3) EQUIPT NOMENCLATURE & APPLICABILITY: Tank, Fuel 236462-001,003-006 Air Combat Fighter XF-12 Serial 001-010

(4) TASK INTERVAL: N/A

(5) DATE COMPLETED: 2-15-78 Rev: 5-3-78

(6) ANALYST: T. Fredericks

INPUT CONDITIONS

(7) REQUIRED CONDITIONS:
Aircraft safe for maintenance (see Worksheet 012)
Aircraft defueled (see Worksheet 035)
Aircraft drained and purged (see Worksheets 101 and 102)
Access panels 2413, 3406, 3417 thru 3429 removed (see Worksheet 114)

(8) PERSONNEL REQUIRED: Two
Person A - remove and install fuel tank units (at unit access)
Person B - act as safety guard and be available for fire extinguisher duty (in a position of quick access to both Person A and extinguisher)

(9) SUPPORT EQUIPMENT:
Fire extinguishers (two)
Maintenance platform, Type 43J6, P/N 1281302

(10) SUPPLIES:

NOMENCLATURE	SPECIFICATION	PART NO.	Quantity
Protective Boots	MIL-C-5501	—	AR

(11) SAFETY CONDITIONS:

WARNING

The removal and installation of the fuselage tank units requires that work be accomplished inside the fuel tanks. To prevent

FIGURE 3. Example of level of detail guide.

1.3. 1 Equipment breakdown

For each designated major, minor, and ancillary equipment of the system a top-down breakdown shall be used or prepared, listing each assembly, subassembly, and sub-subassembly that is maintainable at the organizational and intermediate levels. Maintenance significant piece parts that are maintainable at organizational and intermediate levels but which are not part of a subassembly or sub-subassembly shall also be listed. When functional group codes (FGCs) have been assigned, the breakdown shall be arranged in FGC order. The relationships to the next higher assembly shall be indicated by a system coding method per MIL-STD-863, reference designator, or other

numerical code or by indenture if no code has been assigned. The hardware indenture level of the breakdown shall be that level identified in the Statement of Work or Task Analysis Plan; items belonging to a lower level shall be excluded from the Task Identification Matrics.

1.3.1.1 Latest configuration

The equipment breakdown portion of the Basic TIM as finally submitted to the procuring agency for approval shall reflect the latest approved equipment configuration.

1.3.1.2 Nomenclature

The nomenclature of items in the equipment breakdown shall be that used in the source document. Further descriptive modifiers shall be added parenthetically as needed to clearly identify the item.

1.3.1.3 Item identification

Each item listed in the equipment breakdown shall be further identified by the system code, functional group code, Logistic Support Analysis control number, reference designator, or other number system that positively identifies the item and its system relationship. The numbering system used shall be consistent with that used in other system documentation. Part numbers shall be given as needed for positive identification of equipment items.

1.3.1.4 Maintenance functions

All scheduled and unscheduled maintenance functions applicable at the Organizational and Intermediate levels to the particular system/equipment and its assemblies, subassemblies, sub-subassemblies and maintenance significant piece parts shall be entered as the column headings of the matrix. The following function verbs shall be used as a minimum for all types of systems/equipment, along with additional verbs as necessary and applicable in accordance with

- Align/Adjust
- Checkout/Troubleshoot
- Disassemble/Assemble
- Remove/Replace
- Repair
- Service

- Inspect
- Install
- Test

1.3.1.5 Permissible verbs

Maintenance function verbs, including the above, which are permissible for use as task identifiers are listed with their definitions. If a maintenance function verb requires additional defining or clarifying, the more specific function verb shall be entered in the Notes column. For example, "Service" shall be more positively identified in the Notes column as "Clean," "Lubricate," "Refill," "Recharge," etc., as applicable.

1.3.1.6 Identification of tasks and maintenance level assignments

Each intersection of an equipment item and maintenance function, called a "cell," shall represent a decision point. Each cell shall accommodate two single-character 4L entries. Three decisions shall be reflected on the matrix for each cell; the first two decisions in the left-hand position and the third in the right-hand position:

- Is such a task required to be performed on this item?
- If so, at which maintenance level (0rganizational or no lower than Intermediate) is the task to be performed?
- Is an identified 0rganizational or no lower than Intermediate task to be included in a Job Performance Aids (Job Guide Manual or Logic Tree Troubleshooting Aids)?

1.3.1.7 Maintenance task decisions

All decisions shall be based upon the definitive maintenance concept for the subject system as initially provided by the procuring agency and expanded and refined as necessary by the contractor, and on the requirements of the equipment. The requirements for the first two and third decisions are given below: If a task is not required to be performed on the item, or if required at a level other than Organizational or Intermediate, the cell shall be left blank. A completely blank cell shall always indicate "no such task required at 0 or I level."

- If a determination as to whether or not a task is required cannot be made at the time, enter a question mark (?) in the cell until such time as a decision is

forthcoming. A V? in a cell shall always indicate "a decision is 21 needed."' It is an interimi code only and shall be used only until the decision is made. The final approved TIM as submitted to the Government shall contain no question marks.

- If a task is required to be performed on the item, enter an '0' or an III in the left half of the cell to indicate the lowest maintenance level at which it is capable of being performed, as follows:

0 =This task is required and it can be performed at the Organizational level.

I = This task is required and it can be performed at a level no lower than Intermediate.

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: Short Answer Questions

1. Define task identification? (5 points)
2. Explain maintenance task identification and analysis? (4 points)
3. How do you identify the item in the equipment breakdown? (6 points)
4. Discus on what maintenance task decisions are? (5 points)

Note: **Satisfactory rating – 15 points** **Unsatisfactory - below 15 points**

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

Information Sheet 2- Preparation of equipment for maintenance

2.1 Introduction

“Maintenance, repair and technical service are significant since they affect lifetime of milling machines and ensure them to work non-stop at desired levels. If regular and good maintenance is not performed, machines cannot work for long years.

2.2 **Organizing maintenance activities**

In order to evaluate equipment which maintenance was performed on, maintenance schedule and an inspection schedule are needed. Maintenance schedule has to be planned by maintenance leader in cooperation with management and he/she should complete a number of arrangements before maintenance program takes effect. Detailed records have to be kept in order to ensure efficient control of materials and labor. Inadequate records cause conflict among departments that are related with the breakdown.

Responsible technicians have to draft a form for each machine and equipment of the mill. The forms have to include following information:

- Name of the machine
- Code of the machine
- Location
- Year of production
- Name of manufacturer
- Capacity
- Mechanical drawing
- Power of engines
- Serial number
- List of spare parts
- Supply source

2.3 Maintenance history

Past maintenance activities and maintenance specifications from manufacturers must also be recorded and loaded into maintenance programs. All catalogues, maintenance and repair manuals, spare part catalogues etc. must be asked from manufacturers. This procedure must be performed for every machine at the plant.

2.4 Keeping inspection records

Production manager of the mill must keep records of inspection results and part replacement during repair works. He/she must prepare timetables for preventive maintenance tasks. Maintenance leader must continuously track equipment conditions as part of decision process. This enables to change maintenance programs when it is feasible to do so.

2.5 **Critical spare parts must be in stocks**

It is important for the mill to have critical spare parts available in stocks against possible failures. Giving order for a spare part and stopping the whole shift will cause important losses for the plant. Millers should not evaluate critical stocks as a financial burden for them. Spare part inventory of the mill may change according to maintenance activities in the mill. The management should decide on the components and their amount to stock. To do so they evaluate the location of the mill and they compare logistics cost and stock cost. Spare parts inventory must be tracked closely by management of the mill by means of a computer program.

2.6 **Computer assisted maintenance management software**

Records should be kept well for a reliable maintenance program. Newly developed software (Computerized Maintenance Management System – CMMS) support record keeping, scheduling and cost control tasks significantly. Many software packages involve various interactive modules that share a common database. Each module is assigned to a specific maintenance task like preventive maintenance, inventory control, work orders, procurement, equipment history, job scheduling, backup schedule, human resources planning, budgeting, cost control etc. Maintenance software are designed to run on desktop or laptop computers.

2.7 **Some advantages of computer assisted software are:**

- Decreasing costs
- Compiling data more efficiently
- Better planning
- Minimizing stoppage costs
- Having better controlling opportunities

Self-Check – 2	Written test

Name……ID…… Date…….

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

Test I: Short Answer Questions

1. Write equipment types on cereal food processing? (5 points)
2. What is wrapping? (5 points)

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

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

Information Sheet 3- Selection of hand tools according to task requirements

3.1 Introduction

This sheet provides information on the **use and care of selected hand tools**. Tools are designed to make a job easier and enable you to work more efficiently. If they are not properly used and cared for, their advantages are lost to you. Regardless of the type of work to be done, you must have, choose, and use the correct tools in order to do your work quickly, accurately, and safely. Without the proper tools and the knowledge of how to use them, you waste time, reduce your efficiency, and may face injury.

3.2 Safety tools or equipment

Safety equipment is for you. It will protect you from injury and may possibly save your life. Some of the more common types of safety equipment for your personal protection follow.

3.2.1 Safety shoes

Safety shoes (Figure1) protect feet and prevent injury or loss of toes. Some safety shoes are designed to limit damage to your toes from falling objects. A steel plate is placed in the toe area of such shoes so that your toes are not crushed if an object falls on them. Other safety shoes are designed for use where danger from sparking could cause an explosion. Such danger is minimized by elimination of all metallic nails and eyelets and the use of soles which do not cause static electricity. **Interim Actions** Once a problem as been detected, the first priority should be to contain the problem, and prevent shipment to the customer. If already shipped, the customer needs to be notified to prevent further liability.

Figure1. Safety shoes.

3.2.2 Eye protection

Proper eye protection (Figure 2) is of the highest importance for all personnel. Eye protection is necessary because of hazards caused by infrared and ultraviolet radiation, or by flying objects such as sparks, globules of molten metal, or chipped concrete and wood, etc. These hazards are always present during welding, cutting, soldering, chipping, grinding, and a variety of other operations. I

Figure 2. Eye protection

3.2.3 Helmets

Protective helmets (Figure 3), also known as hard hats, come in a variety of shapes. They may be made of tough polyethylene or polycarbonate, one of the toughest hat materials yet developed. When falling objects strike the hats, the shock absorbing suspension capabilities minimize injuries.

Figure 3. Protective helmet

3.2.4 Gloves

Use gloves whenever you are required to handle rough, scaly, or splintery objects. Special flameproof gloves (Figure 4) are designed for gas and electric welding in order to limit danger and damage from sparks and other hot, flying objects. Personnel working with electricity are usually required to wear insulating rubber gloves (Figure 2-13). Be sure to follow all regulations prescribed for the use of gloves. Gloves must not be worn around rotating machinery unless sharp or rough material is being handled. If such is the case, extreme care should be used to prevent the gloves from being caught in the machinery.

Figure4. Flameproof gloves

3.2.5 Safety belts and safety straps

The safety belt and safety strap (Figure 5) are a must when working in high places. The safety belt, strapped around the waist, contains pockets for small tools. It also has two D-rings used to attach the safety strap.

3.2.6 Ear Protection

Proper hearing protection (Figure 6) is a must when working with or around certain types of power tools. Some tools are capable of producing dangerously high noise levels

which, if ignored, can result in serious hearing loss or injury. Use hearing protection regularly

Figure 5. Safety belt and safety strap

Figure 6. Hearing protection

3.2.7 Reading the scale of a rule or tape

In one sense, the term “scale” means the scale of a drawing. In another sense, it means the succession of graduations on any graduated standard of linear measurement, such as the graduations on a steel tape or a thermometer.

3.2.8 Reading a dial or gauge

Pressure, vacuum, compound, and duplex gauges are used to measure the difference between atmospheric pressure, pressure, and temperature in a system. A typical pressure gauge is constructed of a bourdon tube connected by mechanical linkages and gearing to a pointer.

3.2.9 Measuring and layout tools

There are many types of tools used to measure and lay out projects. Measuring tools include flat steel rules, measuring tapes, wooden folding rules, digital measuring devices, and measuring wheels. Levels are used to check that project components are level and/or plumb.

Plumb bobs are used to check that project components are perfectly upright. Squares are used to mark, check, and measure components of construction projects. When you consider which of these tools to use, keep in mind the following points:

- The tool must be accurate
- The tool should be easy to use
- The tool should be durable
- Numbers on the tool must be easy to read. Black numbers on a yellow or off white background work well.

3.2.10 Dividers

Dividers are instruments used for measuring distances between two points, transferring or comparing measurements directly from a rule, or for scribing an arc, radius, or circle.

Figure7. Diagrame of divider

3.2.11 Fastening and prying tools

Fastening and prying tools are made to either put things together or take things apart. These tools include pliers, hammers, screwdrivers, wrenches, and bars.

3.2.12 Pliers

Pliers (Figure 5-1) are a special type of adjustable wrench that are scissor-shaped tools with jaws. The jaws usually have teeth to help grip objects and are adjustable because the two handles move on a pivot. Pliers are made of hardened steel and come with different head styles that determine their use. Pliers are used to hold, cut, and bend wire and soft metals.

3.2.13 Types and Uses

3.2.13.1 Slip-Joint Pliers

The slip-joint combination pliers (Figure 8) have serrated (grooved) jaws, a rod-gripping section, a cutting edge, and a pivot. The serrated jaws and rod-gripping section are used to hold objects. The cutting edge permits the cutting of soft wire and nails. However, cutting hard materials or large-gauge wire will spring the jaws, making the pliers useless. The pivot is used to adjust the jaw opening to handle large or small objects.

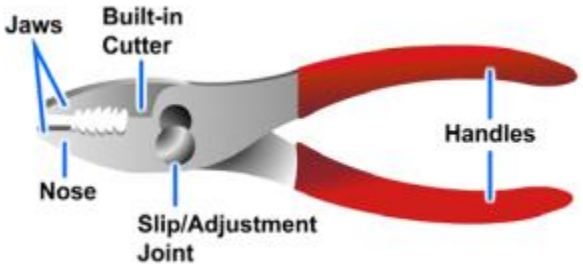


Figure 8 — Parts of a pliers

3.2.13.2 Diagonal cutting pliers

The diagonal cutting pliers (Figure 9) have a fixed pivot. The jaws are offset by about 15 degrees and are shaped to give enough knuckle clearance while making flush cuts. The diagonal cutting pliers are used for cutting small, light materials, such as wire, cotter pins, and similar materials. These pliers are not to be used to hold or grip objects.

Figure 9 — Diagonal cutting pliers.

3.2.14 Straight-lip flat-jaw tongs

The straight-lip flat-jaw tongs (Figure 10) have two straight jaws, a fixed pivot point, and long, straight handles. These tongs are used to hold bearings and bearing inserts while they are set in place.

3.2.15 Vise grip (locking) pliers

A vise grip (Figure 11) is a type of locking pliers. One side of the handle has an adjusting screw used to set the size of the jaws. Some models also include a lever on the opposite side of the bolt to unlock the pliers by pushing the handles apart.

Figure 11 — Vise grip (locking) pliers.

Figure 12. Grasp the long section of the cotter pin. Figure 13. Grasp the other section of the cotter pin.

3.2.16 Hammers

A hammer is a tool used to deliver an impact to an object. Hammers are mostly used to drive nails, fit parts, or break up objects. There are many types of hammers designed for specific uses, which vary in shape and structure. Most hammers include a handle and a head, with most of the weight in the head. The strongest, safest hammers have heads made of tough alloy (two or more metals) or drop-forged steel. The two main types of hammers are claw and ball peen.

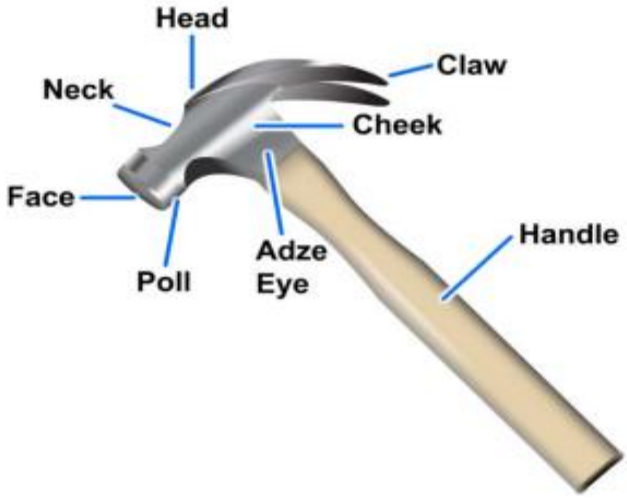


Figure 14. Hammer diagram

3.2.17 Screwdrivers

A screwdriver (Figure 15) is a device used to insert and tighten screws or to loosen and remove screws. A screwdriver has a head or tip that connects with a screw, a mechanism to apply torque by rotating that tip, and a way to position and support the screwdriver. A typical manual screwdriver is made up of a roughly cylindrical handle, with a shaft fixed to the handle, including a tip shaped to fit a particular type of screw. The handle and shaft support and position the screwdriver, and apply torque when rotated. The blade is made of tempered steel so it will resist wear, bending, and breaking.

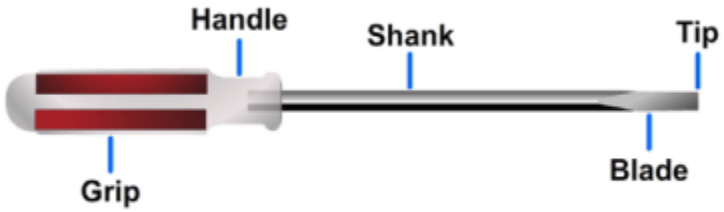


Figure 15. Screw diagram

There are many different types of screwdrivers, identified by the type of screws they fit. Some of the more common types of screwdrivers are flat head, Phillips® head, clutch drive, TORX, Robertson, and Allen (hex).

3.2.18 Wrenches

A wrench is a tool used to provide a mechanical advantage when torque is applied to hold and turn bolts, nuts, screws, and pipes. Wrenches are forged from steel alloy to prevent breakage. Wrenches are divided into two categories: nonadjustable and adjustable. Nonadjustable wrenches are made to work on a particular size of bolt, nut, screw, or pipe. Adjustable wrenches are made to tighten or loosen a particular size of bolt, nut, screw, or pipe.

3.2.19.1 Open-End Wrench

All open-end wrenches have open jaws on one or both ends of the wrench. Most jaw openings are offset from the shank portion of the wrench by 15 degrees. The wrench length is determined by the size of the jaw opening.

Figure 16 — Open-end wrench.

Figure 17 — Ignition wrench.

3.2.19.2 Pipe wrenches

There are four basic types of pipe wrenches: the still son wrench, the spud wrench, the strap wrench, and the chain wrench. They are all used to connect or break pipe joints or to turn cylindrical parts. The pipe wrench (Figure 18) is also known as a still son wrench. It has jaws that bite into the surface of pipe to hold it for turning, and should not be used on plated pipes because it can mar the surface. It is used to screw pipes into elbows or other threaded items.

Figure 18. Pipe wrench

Figure 19. Sockets type wrench

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: short answer

1. What happen If hand tools are not properly used and cared? (5pts)
2. Mention the advantages of hand tools? (5 points)

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

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

Information sheet 4 - Checking tools before use and report unsafe items within standard procedures

4.1 Introduction

Do not use equipment or hand tools unless you have been trained and assessed to a competent level in its safe use and operation, and have been given permission to use this equipment.

Safety glasses must be worn at all times in work areas.

Long and loose hair must be contained when using hand tools.

Safety footwear must be worn at all times in work areas.

Close fitting/protective clothing must be worn when using hand tools.

Rings and jewelry must not be worn when using hand tools.

Hearing protection must be worn where noise levels are in excess of the 85 dB (A) occupational exposure limit.

4.2 Pre-operational safety checks

- Ensure that risk assessment has been read. UQ risk assessment task ID # 37393.
- Ensure no slip/trip hazards are present in workspaces and walkways.
- Always check the condition of tools prior to use.
- Faulty equipment must not be used. Immediately report suspect equipment or tools.

4.3 Operational safety checks

- Use tools that are the right size & right type for your job.
- Follow the correct procedure for using every tool.
- Keep your cutting tools sharp and in good condition.
- Don’t work with oily or greasy hands.
- Cut away from yourself when using chisels and other edged tools.
- Handle sharp-edged and pointed tools with care.
- Always carry pointed tools by your side with the points and heavy ends down.
- Never carry tools in your pockets.
- Do not use tools which are loose or cracked.

- Always place tools or materials where they cannot fall or trip other personnel when not in use.
- Don't force screws; make sure that the correct screw or fixing for the job is being used.
- Where possible, secure work with clamps or a vice, freeing both hands to operate the tool used.
- Keep your balance and proper footing when working, being careful not to overreach.

4.4 Tool Handles

- Handles should fit the hand well.
- Handles must have a good gripping surface e.g. dimpled, and be made of compressible material e.g. not hard plastic or metal.
- Handles must have no sharp edges or areas that dig into the fingers or palm of the hand.
- Tool handles should have a grip span about 6 cm and not more than 9 cm.
- Where possible, tools such as knives or soldering irons should have a guard/stopper at the front.

4.5 Hand Drills

- Tighten drills correctly in the chuck.
- Before starting the drill, always remove the chuck key (if applicable) from the chuck – never leave the key in the chuck.
- Only sharp drill bits should be used. Never use dull, chipped, rounded, or tapered drill bits.
- Remove the drill bit before storing drill.

4.6 Hammers, mallets and hitting tools

- Use pliers to hold small nails.
- Choose the correct size hammer for the job.
- Never hit hammer faces together.

- Never ask other people to hold things you are hitting unless using tongs or a chisel holder.
- Keep clean and free from oil, glue or debris which might cause the handle to slip or the face to glance from the object being struck.
- Make sure the head is wedged securely and that the head and handle are not chipped or broken.
- Grasp handle firmly near the end and keep your eye on the point to be struck.
- Reduce strain when pulling nails by placing a piece of wood under the hammer to increase leverage.
- Don't use a screwdriver, wrench, or other tool as a hammer as this will damage the tool.

4.7 Punches & Chisels

- Keep punches and chisels in good condition. Mushroomed heads can chip & cause injuries.
- Punches are designed to mark metal and other materials that are softer than the point end, to drive and remove pins, and to align holes.
- Never use a punch with a mushroomed struck face or with a dull, chipped, or deformed point. Only use cold chisels for cutting, shaping, and removing metal softer than the cutting edge.
- Factors determining the selection of a cold chisel are the material to be cut, the size and shape of the tool, and the depth of the cut to be made.
- The cold chisel should be held steadily but with a relatively loose grip and with the palm of the hand facing the user and the point of the chisel directed away.
- Ball chisels held by one person and struck by another require the use of tongs or a chisel holder to guide the chisel.
- Metal working chisels can produce flying chips/splinters that can cause injuries to eyes and face.

4.8 Pliers

- Pliers may be used for gripping and cutting operations, but they are not a substitute for a wrench.
- Don't use pliers to turn nuts or bolts.
- Replace adjustable pliers if the jaws slip or bind.
- Replace pliers if the jaw grooves are worn too much for an effective grip.

4.9 Wrenches/Spanners

- Safe use of all wrenches requires that the user always be alert and prepared for the possibility that the wrench may slip, the fastener may suddenly turn free, or the wrench or fastener may break.
- Where possible, use penetrating oil to loosen tight nuts.
- The user must always inspect the wrench for flaws. Keep jaws sharp and clean. Gripping teeth or smooth jaws should not be worn or damaged.
- Place the wrench so the pull on the handle tends to force the jaws further into the nut (lower jaw leads).
- Pulling on a wrench is safer than pushing
- Open end wrenches have strong jaws and are satisfactory for medium-duty turning.
- Replace an open end wrench if the jaws are no longer square.
- Box and Socket Wrenches are necessary for a heavy pull. Never overload the capacity of a wrench by using a pipe extension on the handle or be striking the handle with a hammer.
- Replace a box end wrench if the box edges aren't sharp or true.
- Socket and Adjustable Wrenches should be kept clean of dirt and grime inside the socket to ensure that the tool fits securely on the bolt or nut.
- Replace an adjustable wrench if the jaws have noticeable play, the mechanism slips or binds, or the jaws are rounded.
- Shift wrenches must work freely and adjust properly. Always use the proper size wrench for the job.

- Replace a socket wrench if the wrench binds, if the locking mechanism no longer holds or the wrench won't easily switch from forward to reverse.
- Replace individual sockets if they are cracked, they don't stay on the wrench or extension, or if the faces or corners are no longer true.

4.10 Screw drivers

- Select the correct size screw driver for the job.
- Don't carry screw drivers in your pocket.
- Pass a screw driver to another person handle first.
- When using a slotting screwdriver, use the correct size blade for the given slot.
- Use Phillips head tools for Phillips head fasteners.
- Use positive head tools for positive head fasteners.
- Don't use screwdrivers as a pry-bar.
- Do not use screwdrivers as levers, chisels, or scrapers.
- Don't hold the work piece in the palm of the hand while tightening up screws. A slip can result in a serious injury with the blade penetrating the hand or wrist. The work piece should be securely held in a vice or other firm support.
- Use insulated tools around energized equipment. Electrical tape wrapped on the shank of a screwdriver is not suitable insulation.
- Replace a screwdriver if the tip is chipped, bent, broken or rounded off.

4.11 Potential hazards

- High noise levels
- Flying debris/dust
- Eye injuries
- Sharp edges & burrs
- Material kickback
- Splinters
- Impact/crush injury

4.12 Forbidden

Distracting operator

Using tools for purposes which they are not designed

Self-Check – 4	Written test

Name…… ID…… Date…….

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

Test: Short Answer Questions

1. List down all the potential hazards? (5 points)
2. Don't carry screw drivers in your pocket. Why? (5 points)
3. Do not use equipment or hand tools unless you have been trained and assessed to a competent level in its safe use and operation, and have been given permission, to use this equipment. Why? (5 points)

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

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

Information sheet 5 - Conducting work in accordance with workplace Information

5.1 Introduction

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

5.2 Conducting work in accordance with workplace guideline

A safe work environment includes:

- Facilities,
- Amenities and accommodation.

Facilities refer to toilets, washrooms, showers, lockers, dining areas, drinking water, etc. These facilities must be in good working order, clean, safe and accessible. When considering how to provide and maintain facilities that are adequate and accessible, a person conducting a business or undertaking must consider all relevant matters including:

- The nature of the work being carried out at the workplace
- The nature of the hazards at the workplace
- The size, location and nature of the workplace
- The number and composition of the workers at the workplace.

During Conducting work in accordance with workplace guideline a person should ensure the following requirements:

- Legislative requirements,
- Responsibilities,
- Need assessment,
- work environment,
  - ✓ Welfare facilities
  - ✓ Inspect and monitoring

5.3 Facilities as per legislative requirements

Workplace requirements to help workers to carry out work without risk to health and safety are:

- Layout of the workplace must allow people enter, exit, and move freely under normal and emergency conditions.
- Shall have enough space without risk for work,
- Floors and other surfaces are designed, installed and maintained to allow work,
- Lighting enables to give enough light to:
  - ✓ carry out work with no risk
  - ✓ Move in workplace without risk, and
  - ✓ evacuate safe in emergency,
- Appropriate ventilation,
- Protective devices for controlling extreme heat or cold, and
- Work in near essential services has to be compatible.

5.4 Responsibilities

5.4.1 Facilities management division (or equivalent)

The facilities management division is responsible for ensuring that workplace amenities and facilities are:

- ✓ Designed and installed according to company legislative and requirements
- ✓ Inspected and maintained to ensure a safe level of hygiene.

5.4.2 Company management and supervisors

Management and supervisors of faculties, divisions and units are to ensure that amenities and facilities in the workplace do not expose workers, or visitors to health and safety risks.

This includes:

- ✓ Ensure, so far as is reasonably practicable, that the layout of the workplace, lighting and ventilation enables workers to carry out work without risks to health and safety,

- ✓ Ensure, so far as is reasonably practicable, the provision of adequate facilities for workers, including toilets, drinking water, washing and eating facilities,
- ✓ Manage risks associated with remote and isolated work,
- ✓ Prepare local area emergency response procedures,
- ✓ Implement risk control measures for any unsafe facilities or amenities within their responsibility to ensure the workplace is safe, and
- ✓ Consult with workers on health and safety issues pertaining to facilities and amenities.

5.4.3 Employees

Employees are responsible for reporting any identified hazard in the work environment, facilities or amenities that they become aware of in accordance with factory or company guidelines.

5.4.4 Nature of work performed

The requirements of amenities and facilities will depend on the type of work being performed and the equipment being used. For example, persons handling chemicals or conducting hot and arduous activities may need to access shower and change room facilities. Persons working remotely may require shelter sheds, food and water.

5.4.5 Size and location of the work area

Consideration should be given to the location such as the work area being in a building, remote area or outdoors. The work area may be multiple locations/sites over an extensive area. The workplace may not be in proximity to physical amenities.

5.4.6 The composition of the workforce

The workforce may be comprised of people of different sexes, religious beliefs and those people with special needs. This will influence the provision of amenities and facilities to accommodate the various needs.

Self-Check – 5	Written test

Name…… ID…… Date…….

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

Test I: Short Answer Questions

1. Write things fulfilled in a safe working environment? (5 points)
2. Write work place requirements that the worker should be ensure when conducting the work? (5 points)
3. What are legislative requirements? (5 points)

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

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

Information Sheet 6- Plan and schedule maintenance with affected work areas

6.1 Terminologies and definitions

6.1.1 Planning

Planning is the fundamental management function, which involves deciding beforehand, what is to be done, when is it to be done, how it is to be done and who is going to do it. It is an intellectual process which lays down an organization's objectives and develops various courses of action, by which the organization can achieve those objectives. It chalks out exactly, how to attain a specific goal.

6.1.2 Scheduling

Scheduling is the process of arranging, controlling and optimizing work and workloads in a production process or manufacturing process.

6.1.3 Maintenance

The technical meaning of maintenance involves functional checks, servicing, repairing or replacing of necessary devices, equipment, machinery, building infrastructure, and supporting utilities in industrial, business, governmental, and residential installations. The type of maintenance cannot be equated each equipment, which depends on the method, cost and critical level.

6.2 Maintenance planning work process

There are five distinct phases in executing maintenance work.

6.2.1 Identify the work

All workers have responsibility to identify the defects.

- ✓ From preventive maintenance
- ✓ Adhoc job requests / work requests eg repaint lines on workshop floor
- ✓ Equipment breakdowns
- ✓ equipment maintenance strategy analysis e.g. FMECA/RCM/DOCTOR/RGCA

The following types of maintenance methods are commonly used in several industries.

- ✓ Preventive Maintenance
- ✓ Predictive Maintenance
- ✓ **Corrective Maintenance**
- ✓ Breakdown Maintenance

6.2.2 Plan the work with corrective maintenance

Person responsible for this activity is maintenance planner

- ✓ Planner identifies work, resources and materials required on jobs that can be planned.

Corrective maintenance is a method intended to improve the reliability of equipment/machines by improvising. In addition to equipment, it is also intended for parts that have a short life cycle (reduce the frequency of damage) and speed up repair time.

In other words, this method is to extend mean time between failures and accelerate mean time to repair because of its reliability (activity to prevent recurrence of damage) and maintainability (activity to speed up repair time). Example: The operator has difficulty checking the oil volume of the generator engine, so improvisation is done by making a measuring cup equipped with a scale.

6.2.3 The purpose of planning maintenance

- ✓ Maximum trade 'tool time' (Efficient use of workforce)
- ✓ Quality work done 'right-first-time' (Effective use of resources)

6.2.4 What planned maintenance looks like

- ✓ A work order system used to make assignments to craftsmen/ technicians and to accumulate maintenance data.
- ✓ Maintenance personnel dedicated to the task of planned and scheduled maintenance including predictive and preventive activities.
- ✓ Methods of formal planning and scheduling.
- ✓ Measurement of Planning and Scheduling Results.

- ✓ A means of sharing planning and scheduling information with production personnel and business teams.
- ✓ Regulated Inspections and Repairs – Procedural documentation.
- ✓ Systematic, continuous review, revision and refinement of the planned maintenance system.

6.2.5 Schedule the work when planned

Responsible: Maintenance scheduler

- ✓ Planner/Scheduler schedules the work for the following week with Production.

6.2.6 The purpose of scheduling maintenance

- ✓ Make sure maintenance is done so failure is prevented
- ✓ Least production disruption
- ✓ Right resources and people to the job on-time

6.2.7 Perform the work

Responser: Maint sup'r or Leading Hand

- ✓ Maintenance Superintendent or Leading Hand allocates labour to execute scheduled jobs.
- ✓ Confirms with Production that plant is available and isolations will be ready.
- ✓ Confirms all materials and resources are available when required.
- ✓ Follows-up to ensure work is done.

6.2.8 Close out and record history

Responsible person is maintenance technician

- ✓ The maintenance technician is trained in computer maintenance management system data entry and does the job close-up and job history, as they are the people who actually executed the job.
- ✓ In leau of the maintenance technician should be the Leading Hand but usually defaults to the maintenance planner. Essential that the maintenance technician writes on the computer maintenance management system maintenance job history sheet what was found and what was done.

6.3 Role of the maintenance planner/scheduler

- Plan the Work
- Reviews the backlog (all uncompleted work) and identifies priority work and equipment.
- Planner identifies the extent of work required
- Identifies tasks required for the job.
- Planner identifies Resources and Materials required.
- Ascertains stock item and non-stock item material requirements.

6.4 Job description for a maintenance planner

This job description details the attributes, skills and knowledge required for a person to competently do the duties of a maintenance planner.

Maintenance Planner Duties	
Scope the full extent of maintenance work needed to conduct the relevant repair / preventive / predictive / design-out activities on the organization's plant and equipment	
Develop cost estimates of planned maintenance work to within 10% of final job cost	
Purchase all necessary parts, equipment, services and documentation to perform the maintenance work	
Write applicable maintenance procedures that promote defect-free work quality	
Responsible for up-keep of maintenance history database	
Responsible for up-keep of technical information on plant and equipment	
Appreciation of how maintenance strategy is converted into workplace activities	
Able and competent in root cause failure analysis leadership and investigations	
Apply good stores management practices to ensure parts and equipment retain full reliability while stored	
Personality	
Able to explain their position and justify it respectfully to persons from all organisational levels	
Pleasing demeanor that encourages and supports discussion, interaction and problem resolution	
Well dressed and groomed, looking like a professional	
Prepared to listen to others views on a topic without being judgmental or offensive	
Education and Skills	
Fully certified to perform relevant maintenance activities e.g. applicable licenses, permits and qualifications	
Sound and correct understanding of equipment reliability concepts	
Solid appreciation of risk management strategy and practices related to plant and equipment	
Solid appreciation of quality management methods and practices related to plant and equipment	

Self-Check 6	Written test

Name…… ID…… Date…….

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

Test: Short Answer Questions

1. Define scheduling and maintenance? (5 points)
2. What is the purpose of scheduling maintenance? (4pts)
3. Ist down the five distinct phases in executing maintenance work? (5pts)

Note: **Satisfactory rating - 16 points** **Unsatisfactory - below 16 points**
You can ask you teacher for the copy of the correct answers.

Operation sheet 4– Operational safety checks

- Use tools that are the right size & right type for your job.
- Follow the correct procedure for using every tool.
- Keep your cutting tools sharp and in good condition.
- Don’t work with oily or greasy hands.
- Cut away from yourself when using chisels and other edged tools.
- Handle sharp-edged and pointed tools with care.
- Carry always pointed tools by your side with the points and heavy ends down.
- Never carry tools in your pockets.
- Do not use tools which are loose or cracked.
- Place always tools or materials where they cannot fall or trip other personnel when not in use.
- Don’t force screws; make sure that the correct screw or fixing for the job is being used.
- Secure work with clamps or a vice, freeing both hands to operate the tool used where possible,
- Keep your balance and proper footing when working, being careful not to overreach.

LAP Test	Demonstration

Name---------- ID---------- Date----------

Time started: _____ Time finished: _____

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

Task Objectives/Demands: in accomplishing activities required for this project the student will be able to:

Task	Test
1	Perform operational safety checks

LG #68	LO3: Carry out routine maintenance

Instruction sheet
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Carrying out routine maintenance on equipment • Reporting maintenance activities with workplace reporting 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**: • Carry out routine maintenance on equipment • Report maintenance activities with workplace reporting 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 - Carry out routine maintenance on equipment

1.1 Terminology and definition

Routine maintenance is maintenance activities such as regular inspections or machine servicing. Routine maintenance is done on a regular basis, whether that is daily, weekly, monthly, or yearly. Routine maintenance is an important part of keeping systems up to date and functional.

1.2 Maintenance routine

- Defines how often it's to be done
- When to be done (e.g. a date)
- Shutdown required?
  -Should assign shutdown code
- Should incorporate company's own operating experience

Data source: Installation, operating & maintenance manual

1.3 Maintenance procedure

- Defines or provides information about the job
  - ✓ Scope of work
    - Checklist of tasks to be performed
    - May include the "HOW's"
    - Special tools required
  - ✓ Scaffolding or lifting tool required
  - ✓ Spare Parts required
  - ✓ Revision history of Maint Procedure can be useful
  - ✓ May be used as Test/Calibration Certificate
  - ✓ May include Limit settings for instrumentation/electrical
- **Procedure based maintenance** "The more detailed the procedures and the more insistence on compliance with procedures an organization becomes, the more precise and less error prone its maintenance will be"
- Increasingly more important due to high turnover of staff & outsourcing work

1.4 Materials for work order

Most good systems will do the following:

- Reserve materials for the job
- Material system starts ordering based on delivery lead time
- Nominate a particular warehouse to dispatch
- Nominate a drop point for parts

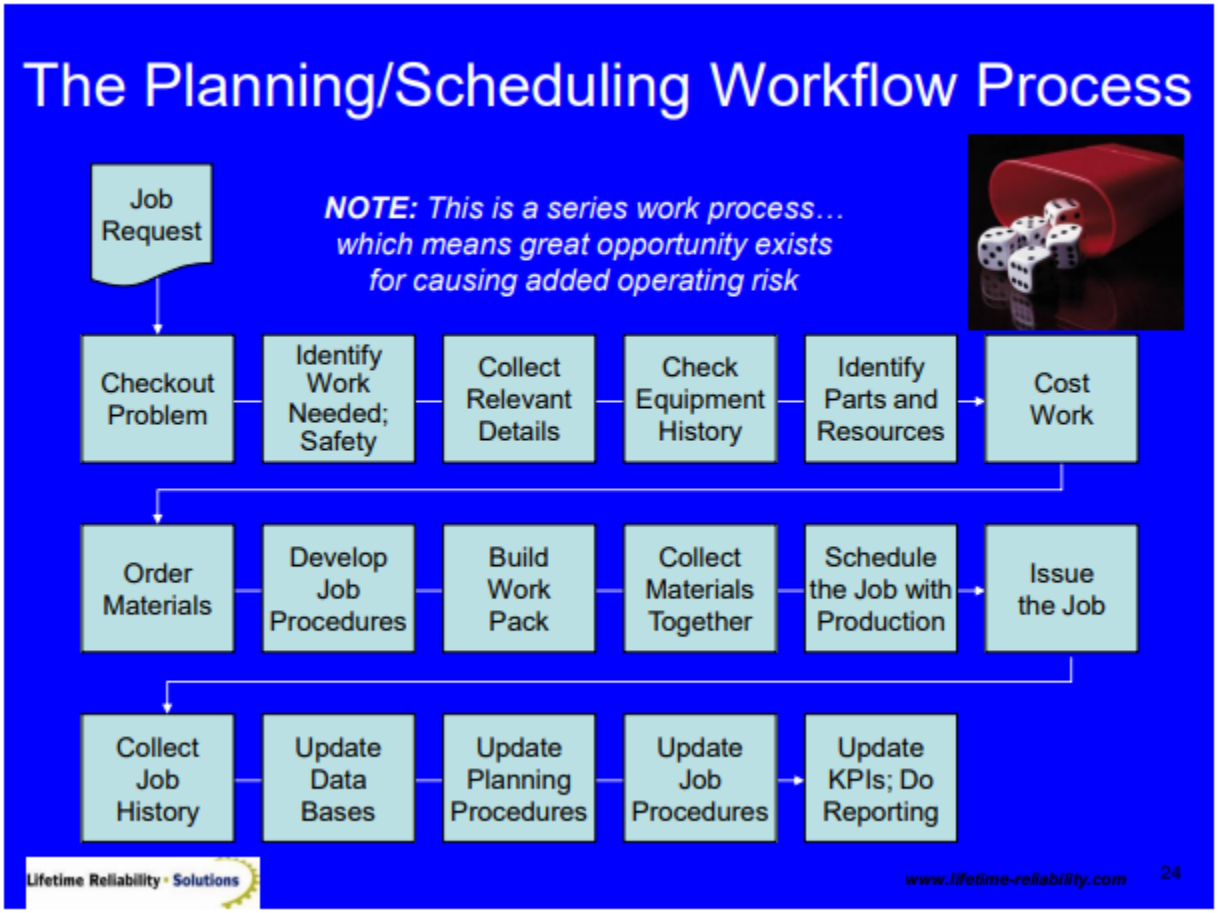
1.5 Demolished (destroyed) equipment

- Preventive maintenance routine
  - ✓ Delete work order
    - Cancel requisition of parts

- Bill of materials
  - ✓ Delete bill of materials if it's not used elsewhere

    A Bill of Materials is a "parts list" of components that may be required to repair or refurbish equipment.
  - ✓ Obsolete/outdated material
    - Delete stock/material no from system

      -Suspends further order of material
    - Dispose of any stock holding


The Planning/Scheduling Workflow Process
Job Request
NOTE: This is a series work process… which means great opportunity exists for causing added operating risk
Checkout Problem
Identify Work Needed; Safety
Collect Relevant Details
Check Equipment History
Identify Parts and Resources
Cost Work
Order Materials
Develop Job Procedures
Build Work Pack
Collect Materials Together
Schedule the Job with Production
Issue the Job
Collect Job History
Update Data Bases
Update Planning Procedures
Update Job Procedures
Update KPIs; Do Reporting
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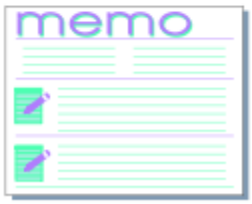
Planning System Documents & their Control
Planning Document Library
Trades Skills Matrix
Job Scope-Out Sheets
Work Order History
Work Order Backlog
Preferred Suppliers/Subcontractors
New Modifications Required
Equipment Register (Parent-Child / Criticality)
Job Plan Bar Charts
Job Procedures

Equipment Records and their Control

- Operating Set Points
- Operating Specifications
- Calibration Settings
- Modifications / Changes e.g. materials, parts
- Inspection Records
- Condition Monitoring Records (inc Operator watch keeping records)
- Past Work Orders
- Photographs
- Root Cause Failure Analysis Reports
- Safety Requirements / Hazards
- Special Access Requirements
- Special Tooling



Job Records and their Control

- Calibration Records
- Check & Inspection Sheets
- Job Feedback
- Forms
- As-Found, After-Adjustment Records
- Work Order
- Watch-keeping Reports
- Inspection Routes Readings

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: Short Answer Questions

1. Define what routine maintenance is? (5 points)
2. What is bill of materials? (5 points)
3. Explain what procedure based maintenance is? (5 points)

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

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

Information Sheet 2- Reporting maintenance activities with workplace reporting requirements

2.1 Introduction

Maintenance can be defined as working on something to keep it in a functioning and safe state and preserving it from failure or decline. Maintenance procedures are written instructions that, when followed by the maintenance personnel, will ensure that equipment operates as designed within safe operating limits. Maintenance may include:

- Sharpening the cutter,
- cleaning,
- lubricating,
- Tightening
- Simple tool repairs and adjustments.

2.2 Types of maintenance

2.2.1 Preventive or proactive maintenance: is carried out to keep something functional. This type of activity is usually planned and scheduled.

2.2.2 Corrective or reactive maintenance: is repairing something to get it working again. This is an unscheduled, unplanned task, usually associated with greater hazards and higher risk levels.

2.3 Routine maintenance tasks

Routine maintenance tasks refer to on-going scheduled tasks that are performed in order to keep hand tools and basic equipment functioning properly. It includes tasks such as:

- unblocking pipes and nozzles,
- sharpening blunt tools,
- cleaning nozzles on sprayers,
- checking, cables and plugs

Some tips on routine maintenance:

- Use the correct tool for the job.
- Keep tools in good condition.
- Handles should be tight and free from defect.
- Cutting tools should be kept sharp.
- Use and maintain power tools according to their operator instructions.
- Make sure power tools are properly grounded or are double insulated.
- Switch off and unplug power tools before changing blades or servicing and repairing.
- Wear clothing that is free of strings or loose ends that could catch.
- Wear appropriate personal protective equipment, such as glasses, goggles, dust masks, face shields, hearing protection, etc.
- Keep all guards and shields in place.
- Unplug and store tools after use.
- Consider keeping power tools locked up to prevent unauthorized use.

2.4 Maintenance check list

Table1. Maintenance check list

Tool	Yes	No	Remark
• Are tools in safe condition?			
• Are instruction manuals available?			
• Are power tools properly grounded?			
• Are guards and shields in place?			
• Is personal protective equipment available?			
• Are tools properly stored?			

If necessary:

- Tighten nuts and bolts.
- Smooth off splinters and sharp points.
- Tighten shafts.
- Unblock pipes and nozzles.

- Sharpen blunt tools.
- Clean nozzles on sprayers.
- Check and maintain cables and plugs.

2.5 Reporting maintenance situation

Every work shop has a different maintenance schedule and it is important that you are familiar with the schedule implemented on the work shop where you work. There will usually be a routine schedule for particular tools that states how often maintenance checks have to be performed. These will also specify the checks that have to be performed. Some tools may require daily checks and maintenance after use.

Tools, such as power tools, usually must be checked once in six months. Complicated power tools would need to be serviced on a regular interval; refer to the operation manual. Maintenance schedule assigns a specific date to specific maintenance tasks. It states what has to be checked and will require that the assigned person signs off the document assuring that the checks were done. If faults are found, the tool must be sent for maintenance and the assigned person that fixes the tool has to report on exactly what was done and when it was completed. **An example of** how to fill or document maintenance required and report performed maintenance is given below**:**

Table2. Tools, check points, and maintenance required

Date	Tool or Equipment	Maintenance check points	Signature	Maintenance required	Signature

Table3. Performed maintenance reporting format

Maintenance Performed	Date	Signature
Splinters shaved off		

2.6 Performing safe maintenance

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

Self-Check – 2	Written test

Name…… ID…… Date…….

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

Instruction: Short answer questions

1. List at list five points in some tips on routine maintenance. (5pts)
2. Define the two types of maintenance (5pts)
3. How do we/you perform maintenance safely? (10pts)
4. Define maintenance and write what maintenance may include. (5pts)

Note: **Satisfactory rating – 20 points Unsatisfactory - below 20 points**
You can ask you teacher for the copy of the correct answers.

Operation sheet 1– Maintenance procedure

- **Defines or provides information about the job**
  - ✓ **Scope of work**
    - **Checklist of tasks to be performed**
    - **May include the "HOW's"**
    - **Special tools required**
  - ✓ **Scaffolding or lifting tool required**
  - ✓ **Spare Parts required**
  - ✓ **Revision history of Maint Procedure can be useful**
  - ✓ **May be used as Test/Calibration Certificate**
  - ✓ **May include Limit settings for instrumentation/electrical**

Operation sheet 2– Routine maintenance tasks

Routine maintenance tasks refer to on-going scheduled tasks that are performed in order to keep hand tools and basic equipment functioning properly. It includes tasks such as:

- unblock pipes and nozzles,
- sharpen blunt tools,
- clean nozzles on sprayers,
- check, cables and plugs

Some tips on routine maintenance:

- Use the correct tool for the job.
- Keep tools in good condition.
- Handles should be tight and free from defect.
- Cutting tools should be kept sharp.
- Use and maintain power tools according to their operator instructions.
- Make sure power tools are properly grounded or are double insulated.
- Switch off and unplug power tools before changing blades or servicing and repairing.
- Wear clothing that is free of strings or loose ends that could catch.
- Wear appropriate personal protective equipment, such as glasses, goggles, dust masks, face shields, hearing protection, etc.
- Keep all guards and shields in place.
- Unplug and store tools after use.
- Consider keeping power tools locked up to prevent unauthorized use.

LAP Test	Demonstration

Name---------- ID---------- Date----------

Time started: _____ Time finished: _____

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

Task Objectives/Demands: in accomplishing activities required for this project the student will be able to:

Task	**Test**
1	Apply maintenance procedure.
2	Perform routine maintenance tasks.

LG #69	LO4: Complete maintenance tasks

Instruction sheet

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

- Returning equipment to operating order.
- Soring tools and materials with workplace procedure.
- Notifying relevant personnel maintenance completion.
- Maintaining housekeeping standards.
- Conducting work accordance with workplace environmental guidelines.

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**:

- Returning equipment to operating order
- Storing tools and materials with workplace procedure
- Notifying relevant personnel maintenance completion
- Maintaining housekeeping standards
- Conducting work accordance with workplace environmental guidelines

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- Returning equipment to operating order

1.1 Introduction

Work orders are essential elements for maintenance because they provide relevant details about upkeep, repair, or operations work, such as replacing parts, performing an inspection or returning an asset to operating condition.

1.2 Terminologies and definition

Equipment users are Including clinic and operating theatre staff, can be trained to perform many of the simple care and maintenance duties that need to be done on a regular basis, such as dusting, cleaning, lubricating, protecting, and checking equipment, including safety checks.

Equipment test is a process of performing check on tools/machinery after maintaining it in order to prevent the tools from damage or faulty output of the machine. It is important to perform checks on tools because; if we use it without testing, it may completely damage or out-off use /function.

1.3 Returning equipment

Returning equipment to service is a potentially hazardous task, with the risks increased due to time pressures. Equipment deficiencies, human error, time pressures, and poor judgment all increase the probably of an incident. Understanding these increased risk factors and having a good mitigation plan will go a long way toward reducing these risks. When returning equipment for operating order after repair

While you are going too restarted to operate that equipment, be sure which fulfil the working parameter requirements and get a confirmation from the technicians.

Working parameters to be monitored include but not limited to:

- Equipment performance (e.g. Speed, output, variations)
- Equipment component performance
- Sequences and timing of operation
- Materials changes (desired and not desired)

1.4 Work order

It is a written means of communicating information about a task. For example, an electrician may receive a work order to complete a project at a construction site or to repair installation parts. A maintenance work order provides details about repair or operations such as replacing a part, returning an asset to operating condition, or performing an inspection. A work order is a communication tool that should include all the necessary information to perform a task and specify which team member should carry out particular jobs.

1.5 Work order process

Work order process is a system for ensuring accountability and delivery for every step required to complete a work request. A well-defined work order process will reduce equipment downtime and help keep good communication from start to finish. Every maintenance work order has a life cycle with few main phases that can be broken down into several steps that we have listed.

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: Short Answer Questions (15%)

1. What does mean equipment users (3 point)
2. What is equipment test? (3 point)
3. What is returning equipment? (4 points)
4. Write down working parameters. (5point)

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

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

2.1 Storing equipment

After completing maintenance activity, tools and materials that are used for maintenance activity should be restore appropriately.

2.2 Maintaining equipment storage

Hand tools are stored safely in appropriate location according to standard operational procedures and manufacturers' recommendations. It's important that the tools used around dairy processing maintain their hygienic qualities. Leaving contact tools unorganized and in unsanitary locations when not in use is not advised. Proper storage in a clean, protected storage area ensures good hygiene and helps extend tool life. Limiting the storage of tools within their assigned areas is often recommended.

Extreme temperatures and/or humidity levels can affect the life and lasting quality of the product contact tools and equipment. Extremely cold temperatures or long exposure to very cold temperatures can cause fracturing of tools and possible physical hazards in a food facility. High-humidity areas that do not allow for proper tool drying can support the growth of microbial hazards. There should be sufficient storage location and procedures for a range of power tools in a work place.

Figure 1. Tools and equipment storage after maintenance

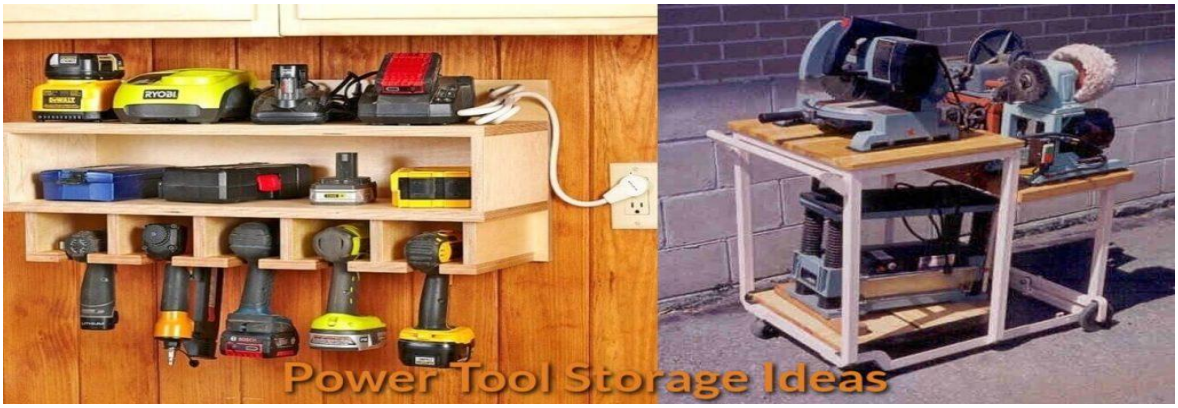


Figure 2. Power Tools and equipment storage after maintenance

Self-check 2	Written test

Name…… ID…… Date…….

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

Test II: Short Answer Questions (15 %)

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

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

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

3.1 Introduction

Relevant personnel means all full-time, part-time, or contract personnel whose job responsibilities related in any way to the processing, or any other products by the divestiture Assets, at any time. Relevant persons means, with respect to any individual, partnership, joint venture, corporation, trust, limited liability company, unincorporated organization or other entity ("Person"), such person's officers, directors, employees, agents, distributors and other persons acting for or on behalf of such person.

3.2 Five key points for notifying relevant personnel on job

3.2.1 Relevant experience

Make sure that the jobs, experience, and accolades that you do include are relevant to the position you're applying for.

3.2.2 The right skills

This is a great time to run wild with those keywords found in the job description. If they're looking for someone with Clean Bathrooms, be sure to list it as a skill.

Participated in facility safety committee in order to ensure all OSHA guidelines were met.

3.2.3 Quantifiable achievements

Achievements and awards relevant to the position speak louder than a high GPA, especially if you can quantify your achievement with a number.Initiated assembly line projects to improve product distribution by 10% within the facility.

3.2.4 Your unique qualities

Recruiters and hiring managers are looking at hundreds of resumes. Let yours stand out, and try not to sound too boring.

Job duties: janitorial work, med cart repair, vehicle maintenance, traveling to other sites.

3.2.5 Strong content

If you've had a lot of jobs, this shouldn't necessarily be a list of all of them. This is a document designed to market you to a potential employer, so choose the strongest content.

3.3 Responsibility of relevant personnel

- Maintain compliance with the regulations of OSHA.
- Monitor facility for signs of potential security risks and contacted management and In-Store Loss Prevention when problems were identified.
- Maintain standard of cleanliness of Wal-Mart facility.
- Perform cleanliness of all assess of retail facility for consumer/employee use
- Ensure Occupational Health and Safety Act guidelines were being followed properly for: Hazardous communications.
- Maintain proper OSHA standards for set up and break down of equipment

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: Short Answer Questions (15 %)

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

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

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

Information sheet 4- Maintaining housekeeping standards

4.1 Type of Workplace

The workplace may be permanently fixed, mobile or even temporary based on one off work (promotional activities), seasonal work types, work involving one off situation with different duration (hours, days or weeks).

4.2 Access

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

4.3 Maintenance

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

4.4 Work layout

The layout of the workplace is required to allow persons to enter and exit the workplace and move within safely, both under normal work conditions and in an emergency.

4.5 Entry and exit

Entries and exits are required to be safe to allow impeded access and outlet for all workers, students and visitors including those with special needs. **In particular:**

- Entries and exits should be slip resistant under wet and dry conditions
- Any walkways, boundaries or pathways shall be marked with standard wide with a contrasting color e.g. white or yellow
- Open sides of staircases should be guarded with an upper rail at standardized or higher and a lower rail
- Handrail should be provided on or at least one side of every staircase

- Separate entry and exits for mobile equipment e.g. forklifts or trucks, and pedestrians are to be provided
- Power operated doors and gates should have safety features to prevent people from being stuck or trapped.
- Location of exits should be clearly marked and signs posted to show direction of exit doors to aid emergency evacuation.

4.6 Work areas

The layout of the work area should be designed to provide sufficient clear space between machines, fixtures and fittings so workers can move freely without strain or injury also evacuate quickly in case of an emergency. **In determining how much space is required, the following should be considered:**

- The physical actions needed to perform the task,
- The need to move around while working,
- Whether the task is to be performed from a sitting or standing position
- Access to workstations
- The equipment to be handled and the personal protective equipment that may be worn to perform the work.
- Environmental factors including heat or noise may require an increase to the space, as will work activities that involve manual tasks or the use of equipment.

4.6.1 Floors and other surfaces

Floor surfaces shall be suitable for the work area and be chosen based on the type of work being carried out at the workplace, as well as the materials used during the work process, the likelihood of spills and other contaminants, including dust, chemicals, and the need for cleaning. **In general:**

- ✓ Floors shall be free from slip or trip hazards e.g. cables, uneven edges, broken surfaces
- ✓ Floor surfaces shall have sufficient grip to prevent slipping, especially in areas that may become wet or contaminated
- ✓ Anti-fatigue matting, carpet, shock absorbent underlay, cushion backed vinyl shall be provided for workers where static standing occurs

- ✓ Carpet shall be properly laid without loose edges or ripples and should be well maintained
- ✓ Floors should be strong enough to support loads placed on them.

4.6.2 Workstations

Workstations should be designed so workers are comfortable undertaking their task and allow for a combination of sit and standing tasks.

For tasks undertaken in a seated position, workers should be provided with seating that:

- ✓ Provides good body support, especially for the lower back
- ✓ Provides foot support, preferable with both feet flat on the floor, otherwise a footrest shall be provided
- ✓ Allows adequate space for leg clearance and freedom of movement
- ✓ Is fully adjustable to accommodate different size workers (e.g. seat height, back rest height and back rest tilt adjustments) and should not tip or slip utilizing a five-point-base
- ✓ Chairs shall be fitted with castors for carpeted surfaces and glides or braked castors on hard surfaces.

Workstations shall be designed and procured according to FMD (Facilities Management Division) Design Standards and Australian

4.6.3 Lighting

Sufficient lighting is required to allow safe movement around the workplace and to allow workers to perform their job without having to adopt awkward postures or strain their eyes to see.

Emergency lighting is to be provided for the safe evacuation of people in the event of an emergency. **Factors to be taken into account are**:

- ✓ The nature of the work activity,
- ✓ The nature of hazards and risks in the workplace,
- ✓ The work environment,
- ✓ Illumination levels, including both natural and artificial light,
- ✓ The transition of natural light over the day,
- ✓ Glare workplace environment guidelines,

- ✓ Contrast, and
- ✓ Reflections.

4.6.4 Air Quality

Workplace are to be adequately ventilated which includes provision of fresh, clean air drawn from outside the workplace, uncontaminated from flues or other outlets and be circulated through the workplace. Workplace inside buildings may have natural ventilation, mechanical ventilation or air conditioning.

An air-conditioning system should:

- ✓ Provide a comfortable environment in relation to air temperature, humidity and air movement
- ✓ Prevent the excessive accumulation of odours.
- ✓ Reduce the levels of respiratory by-products, especially carbon dioxide, and other indoor contaminants that may arise from work activities
- ✓ Supply an amount of fresh air to the workplace, exhaust some of the stale air as well as filter and recirculate some of the indoor air.
- ✓ **Natural ventilation** should consist of permanent openings, including windows and doors, that:
- ✓ In total are the size of at least five per cent of the floor area of the room
- ✓ Are open to the sky, an open covered area or an appropriately ventilated adjoining room.

Natural ventilation may be assisted by mechanical ventilation. Enclosed workplaces should be supplied with comfortable rates of air movement (usually between 0.1 m and 0.2 m per second). Air-conditioning and other ventilation systems should be regularly serviced and maintained in accordance with manufacturer's instructions. Cooling towers that form part of many air-conditioning systems are to be inspected, tested and treated as per legislative requirements. Work processes that release harmful levels of airborne contaminants (e.g. lead fumes, acid mist, solvent vapor) are to be undertaken with specific control measures in place to remove them at the source, e.g. fume cupboards. Refer to the Working with Hazardous Chemicals Guidelines for further information regarding monitoring of hazardous chemicals.

4.6.5 Heat and cold

Refer to the Thermal Comfort Guidelines for further information on managing health and safety risks associated to hot and cold environments

4.6.6 Welfare facilities

Workers, including those who have particular needs or disabilities, must have access to the facilities provided. **Workers are to be provided with:**

- ✓ Adequate breaks to use the facilities,
- ✓ Facilities which are within a reasonable distance from the work area,
- ✓ Shift workers have similar access to those who work during the day, and
- ✓ A means of access which is safe.

Self-Check – 4	Written test

Name…… ID…… Date…….

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

Test: Short Answer Questions

4. Mention welfare facilities should be fulfilled in the work area? (5 points)
5. What are the requirements a person should ensure during conducting work in accordance with workplace guideline? (6pts)
6. Write at list five items that a work environment, facilities and amenities are provided for basic health and welfare of employees, contractors and visitors? (5pts)

Note: **Satisfactory rating - 16 points** **Unsatisfactory - below 16 points**
You can ask you teacher for the copy of the correct answers.

Information Sheet 5 -Conducting work accordance workplace environmental guidelines

5.1 Introduction

The goal of food packaging is to contain food in a cost-effective way that satisfies industry requirements and consumer desires, maintains food safety, and minimizes environmental impact.

5.2 The trouble with food packaging

The trouble with food packaging begins at its creation. Each form of packaging uses a lot of resources like energy, water, chemicals, petroleum, minerals, wood and fibers to produce. Its manufacture often generates air emissions including greenhouse gases, heavy metals and particulates, as well as wastewater and/or sludge containing toxic contaminants. In other words, landfills emit ammonia and hydrogen sulfide and incinerators can emit mercury, lead, hydrogen chloride, sulfur dioxides, nitrous oxides and particulates.

5.3 Legislative Requirements

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

- The layout of the workplace should allow persons to **enter, exit** and move without health and safety risk, both under normal working and emergency conditions,
- Work areas **space for work** to be carried out without risk to health and safety,
- Floors and other surfaces are designed, installed and maintained to allow work to be carried out without health and safety risk,
- Lighting enables:
  - ✓ Each worker to carry out work without risk to health and safety, and
  - ✓ Persons to move within the workplace without risk to health and safety, and
  - ✓ Safe evacuation in an emergency,
- Ventilation enables workers to carry out work without risk to health and safety,

- Workers carrying out work in extremes of **heat or cold** are able to carry out work without risk to health and safety,
- Work in relation to or near essential services does not give rise to a risk to the health and safety of persons at the workplace.

Ethiopian food standard code follows requirements notified in structured format regulations or legislation for:

- Food and drug authority
- Occupational health safety environmental management
- Food standards and additives
- Weights and measures
- packaging & labelling
- Contaminants & toxins
- Prohibitions and restrictions
- laboratory sampling and analysis

Self-Check – 5	Written test

Name…… ID…… Date…….

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

Test I: Short Answer Questions

1. Write legislative requirements that the person who conducting a business has to follow? (6 points)
2. Mention Ethiopian food standard codes? (5 points)

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

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

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