Textile Chemical Processing

NTQF Level-II

Learning Guide#28

Unit of Competence: Perform Minor Maintenance

Module Title: Performing Minor Maintenance

LG Code: IND CHP2 M09 L01-LG28

TTLM Code: IND CHP2 TTLM9 0919v1

LO 1: Operate machine and assess performance

Instruction Sheet	Learning Guide #28

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

LO1. Operate machine and assess performance

1.1 Starting and Stopping Machine

1.2 Monitoring Machine operation

1.3 Identifying and reporting machine problem

1.4 Basic machine maintenance and repair techniques

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

- Start and stop Machine according to manufacturer requirements.
- Monitor and assess Machine operation to ensure correct procedure.
- Identify and report machine Problem

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4”
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ”
6. Do the “LAP test” (if you are ready).

Information Sheet-1	Starting and Stopping Machine according to manufacturer requirement

1.1Introduction to Maintenance

Definition: Maintenance is a set of ***organized activities*** that are carried out in order to keep an item in its **best operational condition** with minimum cost acquired

Objectives & Benefits of maintenance

- Maximizing production or increasing facilities availability at the lo*west cost* and at the *highest quality* and *safety standards*.
- Minimizing energy usage.
- Optimizing the useful life of equipment.
- Providing reliable cost and budgetary control.
- Identifying and implementing cost reductions.
- Reducing breakdowns and emergency shutdowns.
- Optimizing resources utilization.
- Reducing downtime.
- Improving spares stock control.
- Improving equipment efficiency and reducing scrap rate.

1.2 Starting and stopping Machine according to manufacturer requirement

- Start and stop any textile machinery in accordance with all safety, workplace standard operating procedures and manufacturer requirements.
- All textile machinery has its own manufacturing requirements, safety and standard operating procedures during starting and stopping the machine.
- Dyeing machinery is started and stopped in accordance with workplace standard operating procedures.

Manufacturer requirements of dyeing machine during operation

- Understand and follow the instruction from lot card and program book.
- Switch on main power and then open compressed air, water valve and steam.

- Check the quality and lot number of the fabric before putting on the machine by checking the label.

- Transport the fabric to be run, to the inlet of winch dyeing machine using hydraulic hand puller or electric truck.

- Clean the entire machine and winch roll, load 10-15 meters of leader fabric.

- Ensure the processes to be done (ie) scouring/bleaching or dyeing or washing.

- Initially fill the water in the trough and clean the bottom of the trough thoroughly.

- Prepare the required chemicals approved by supervisor.

- Start loading the fabric in the winch machine.

- While loading ensure no entanglement of fabric is there.

- Observe for any defect in the fabric while loading.

- Set the important parameter in the machine:
    - ✓ Machine speed – 10-40 m/min
    - ✓ Fixed speed of loading and unloading –as per quality
    - ✓ Max. Temperature – 98 ^{o}C
    - ✓ Fabric tension in practice – NIL
- Check for various fabric defects like stains – dust, chemicals, rust, handling stains, crease, water dropping, oil, grease, etc.

- Check the fabric shade if dyeing process is carried out and whiteness index for bleaching process before unloading.
- Stop the machine

Switching on the main power panel

Opening Steam, water and air valve

Selection of dye powder

weighing the dye powder

Mixing of dyes in chemical tank

Setting sequence of operation

Transportation of chemical

Preparation tank

Loading of fabric in winch

Dyeing in progress

After dying fabric is taken for rope opener and further drying

Self-Check -1	Written Test

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

Fill in the black space

1. _____ is a set of ***organized activities*** that are carried out in order to keep an item in its **best operational condition** with minimum cost acquired? (2points)
2. ---------- is the maximum operating temperature of winch dyeing m/c? (2 point)

Short answer questions

3. Write at least 4 objectives of maintenance? (4 point)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 2	Monitoring and assessing Machine operation

2.1 Machine Condition Monitoring and Assessing

When a fault takes places, some of the machine parameters are subjected to change. The change in the machine parameters depends upon the degree of faults and the interaction with other parameters. In most cases, more than one parameter are subjected to change under abnormal condition.

The monitoring and diagnosis of machinery is a well-established discipline, but much progress remains to be made in automating diagnosis as well as developing low-cost reliable technologies which can be applied cost-effectively in the majority of production environment.

Condition monitoring can be carried out when the equipment is in operation, which known as on-line, or when it is off-line, which means when it is down and not in the operation. While on-line, the critical parameters that are possible to monitor are speed, temperature, vibration, and sound. These may be continuously monitored or may be done periodically. Off-line monitoring is carried out when the machine is down for whatever reason.

The International Standards Organization's Technical Committee 108 (ISO/TC108) produces standards in the area of mechanical vibration, shock, and machine condition monitoring.

Machine condition monitoring (MCM) is a vital component of preventive and predictive maintenance programs that seek to reduce cost and avoid unplanned downtime.

Machine Condition monitoring is taken to mean the use of advanced technologies in order to determine equipment condition, and to predict potential failure.

It includes, but is not limited to, technologies such as **visual inspection**, **vibration measurement** and analysis, **temperature monitoring**, **acoustic emission analysis**, **noise analysis,** oil **analysis, wear debris analysis**, **motor current signature analysis**, and nondestructive testing.

1. **Visual Inspection: -** visual monitoring can sometimes provide a direct indication of the machine's condition without the need for further analysis. The available techniques can range from using a simple magnifying glass or low-power microscope. Other

forms of visual monitoring include the use of dye penetrates to provide a clear definition of any cracks occurring on the machine surface, and the use of heat-sensitive or thermo graphic paints.

2. **Vibration Analysis: -** Modern condition monitoring techniques encompass many different themes; one of the most important and informative is the vibration analysis of rotating machinery. Using vibration analysis, the state of a machine can be constantly monitored and detailed analysis may be made concerning the health of the machine and any faults which may arise or have already arisen.
3. **Temperature Monitoring: -** Temperature monitoring consists of measuring of the operational temperature and the temperature of component surfaces.

   Monitoring operational temperature can be considered as a subset of the operational variables for performance monitoring. The monitoring of component temperature has been found to relate to wear occurring in machine elements, particularly in journal bearings, where lubrication is either inadequate or absent. The techniques for monitoring temperature of machine components can include the use of optical pyrometers, thermocouples, thermo graphy, and resistance thermometers.
4. **Noise Analysis: -** Noise signals are utilized for condition monitoring because noise signals measured at regions in proximity to the external surface of machines can contain vital information about the internal processes, and can provide valuable information about a machine's running condition. When machines are in a good condition, their noise frequency spectra have characteristic shapes. As faults begin to develop, the frequency spectra change. Each component in the frequency spectrum can be related to a specific source within the machine. This is the fundamental basis for using noise measurement and analysis in condition monitoring.

Inspect and Monitor Components for Wear and Damage

A planned maintenance schedule can predict component wear. Visually inspect components on an ongoing basis to monitor wear and prevent equipment failure. Components that must be replaced ahead of schedule may signal a larger problem that needs to be diagnosed.

Check belts, pulleys and chains for alignment and condition. Inspect gears and sprockets for broken teeth, cracks and misalignment.

Key Benefits of Machine Monitoring during operation

- Improved manufacturing efficiency
- Reduced production wastes for increased profits
- Improved operator engagement and overall company communication
- Automated data collection and analysis
- Custom reporting
- Increased overall machinery efficiency

Self-Check -2	Written Test

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

Say True or False

1. ---------- Machine condition monitoring (MCM) is a vital component of preventive and predictive maintenance programs.(2 point)
2. ---------- Monitoring and diagnosis of machinery is not a well-established discipline in maintenance.(2 point)

Short answer question

3. Write at least 3 key benefits of monitoring machine operations? (3 point)
4. Explain the methods of monitoring machine condition? (4 point)

Note: **Satisfactory rating – 6.5 & above points** **Unsatisfactory rating - below 6.5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Identifying and reporting machine problem

3.1 Introduction

Machine fault problems are broad sources of high maintenance cost and unwanted downtime across the industries. The prime objective of maintenance department is to keep machinery and plant equipments in good operating condition that prevents failure and production loss. If the department organizes a predictive maintenance program, this goal as well as cost benefits can be achieved, while accurate information at the right time is a crucial aspect of a maintenance regimen.

The condition-based maintenance strategy is being employed for uninterrupted production process in industries. Condition-based maintenance (CBM) consists of continuously evaluating the condition of a monitored machine and thereby successfully identifying faults before catastrophic breakdown occurs.

3.2 Machine problem/fault identification can be done with different methodologies

- Vibration signature analysis method
- Lubricant signature analysis method
- Noise signature analysis method
- Temperature monitoring method with the use of appropriate sensors, different signal conditioning, and analyzing instruments.

Vibration signature analysis Techniques for machine fault identification are the most popular among other techniques.

Vibration monitoring is based on the principle that all the system produces vibration. When a machine is operating properly, the vibration is small and constant, however, when faults develop and some of the dynamic process in the machine changes, there will be changes in vibration spectrum observed.

Modern manufacturing plants are highly complex. Failure of process equipments and instrumentation increased the operating costs and resulted in loss of production. Undetected or uncorrected malfunctions can induce failures in related equipments and, in extreme cases, can lead to catastrophic accidents. Early fault detection in machines can save millions of dollars on emergency maintenance and production-loss cost.

There are certain objectives of machine problem/fault identification:

(I) Prevention of future failure events

(ii) Assurance of safety, reliability, and maintainability of machineries.

Reporting for identified machine problems

Fault Reporting is a maintenance concept that increases operational availability and that reduces operating cost through three mechanisms.

- Reduce labor-intensive diagnostic evaluation
- Eliminate diagnostic testing down-time
- Provide notification to management for degraded operation

This is a prerequisite for Condition-based maintenance.

Active redundancy can be integrated with fault reporting to reduce down time to a few minutes per year.

- Passive redundancy
- Active redundancy

Maintenance requires three actions.

- Fault discovery
- Fault isolation
- Fault recovery

Self-Check -3	Written Test

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

Choose the best answer

1. _____is objectives of machine problem/fault identification: (2 points)

A. Prevention of future failure events B. Assurance of reliability

C. Assurance of safety D. All

2. ---------- one of the following is a methodology of machine problem identification?(2 point)

A. Vibration signature analysis B. Lubricant signature analysis

C.Noise signature analysis D. All E. None

Say True or False

3. ---------- Machine fault problems are broad sources of high maintenance cost and unwanted downtime across the industries? (2point)

4. ---------- **Vibration signature analysis** Techniques for machine fault identification are the most popular among other techniques? (2 point)

Short answer questions

5. Write the methods of machine problem identifications? (4 point)

Note: **Satisfactory rating – 8 and above** **Unsatisfactory - below 8 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-4	Basic machine maintenance and repair techniques

Introduction

Definition

Maintenance

Maintenance is an action or actions to retain or restore the desired (required) state of as well as to asses and determine the actual state of technical means of a system.

Depends on the weight of the failure, maintenance divided in to:

Inspection & servicing, minor maintenance & over all maintenance

Inspection

- Inspection may include:
  - Reading dials, gauges, meters
  - Observations including those using sight, hearing, smell, feel
  - Observations of product quality/faults/rejects.

Servicing

Servicing may include:

- Cleaning
- Lubricating
- Topping up
- Adjusting

- Minor maintenance- repairing & replacing some small parts of a machine or equipment
- Overall maintenance-disassembling & replacing spare parts of a machine

Basic machine maintenance and repair technique

1. **Corrective maintenance**

"Maintenance carried out after fault recognition and intended to put an item into a state in which it can perform a required function."

This management type is simple and straightforward, "fix it when it breaks", i.e. the things are fixed either after failure or during failure. This maintenance type is emergency, repair, unscheduled and remedial tasks.

2. Preventive Maintenance

- The preventive tasks mean replacing components or overhauling items at fixed intervals.
- Schedule of planned maintenance actions aimed at the prevention of breakdowns and failures.
- Primary goal-Preserve and enhance equipment reliability.
- Preventive maintenance encompasses activities, including adjustments, replacement, and basic cleanliness, that forestall machine breakdowns.

Examples of PM

- Oiling
- Greasing
- Changing filters
- Belt tightening

Regular planned preventive maintenance: -

- Minor repair (small repair)
- Medium repair
- Major over hauls

Predictive Maintenance and Operator Maintenance

Operator Maintenance is defined as:

"Maintenance carried out by qualified user or operator."

Predictive Maintenance is defined as:

- "Condition based maintenance carried out following a forecast derived from the analysis and evaluation of significant parameters of the degradation of the item."
- Techniques that help determine the condition of in-service equipment in order to predict when maintenance should be performed.
- Primary goal – Minimize disruption of normal system operations, while allowing for budgeted, scheduled repairs.

Examples of predictive maintenance

- Vibration analysis
- Infrared thermograph
- Oil analysis
- Visual inspections

Proactive Maintenance

"The tasks undertaken before a failure occurs, in order to prevent the item from getting into a failed state. These tasks hold what is traditionally known as 'predictive' and 'preventive' maintenance." This is in contrary to corrective tasks which deal with the already failed state. Proactive maintenance is based on theoretical risk analyses. Proper countermeasures are taken to avoid failures. The characteristics of proactive maintenance are a control over the maintenance resources. With the advent of correct maintenance scheduling and planning procedures the understanding of what is required of the maintenance resources weekly often change vast and rapid. The weekly planning period can often later extend to monthly planning.

The factors of evaluation maintenance choice depend on:

- Efficient operation
- Effectiveness
- Profitability
- Low cost

Factors of evaluation for organizing good maintenance

The performance of maintenance can be judged by the condition of machinery as indicated by the following factors

1. **Performance**: Machines must be capable of performing the function for which they are intended.
2. **Down time**: Machine down time must be at an acceptable level
3. **Service life**: Machine must provide a satisfactory return on investment before replacement become necessary.
4. **Efficiency** : machine must operate at an acceptable level of efficiency

5. **Safety :** Machines must operate safely and not dangerous for personnel
6. **Environmental impact**: Machines must operate in a manner that is not detrimental(harm full) to the environment or to adjacent plant or equipment.
7. **Cost:** The cost of maintenance must be acceptable.

Self-Check -4	Written Test

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

Choose the best answer

2. One of the following is examples of preventive maintenance?(2 point)

   A. Oiling C. Greasing

   B. Changing filters D. A& B E. none

3. One of the following is examples of predictive maintenance?(2 point)

   A. Vibration analysis B. Oil analysis

   C. Visual inspections D.B&C E. All

Short answer questions

4. Write basic machine maintenance techniques?(4 point)
5. What is maintenance? (2 point)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Starting and stopping m/c according to manufacturer requirement

1.1. The techniques of Starting and stopping winch dyeing m/c according to manufacturer requirement

Procedure

1) Understand and follow the instruction from lot card and program book.
2) Switch on main power and then open compressed air, water valve and steam.
3) Check the quality and lot number of the fabric before putting on the machine by checking the label.
4) Clean the entire machine and winch roll, load 10-15 meters of leader fabric.
5) Initially fill the water in the trough and clean the bottom of the trough thoroughly.
6) Prepare the required chemicals approved by supervisor.
7) Start loading the fabric in the winch machine.
8) While loading ensure no entanglement of fabric is there.
9) Set the important parameter in the machine:
10) After finish the operation Stop the machine carefully

Operation Sheet 2	Monitoring and assessing Machine operation

Techniques for Monitoring and assessing Machine operation

Step 1- Visualize the machine for inspections

Step 2- Measure vibration of the machine

Step 3- Monitor the temperature of machines

Step 4- Measure noise signals of the machine

Step 5-Measure motor current signals of machines

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 6-12 hours.

Task 1: operate winch Dyeing machine

Task 2: Monitor Machine operations

List of Reference Materials

1. *"Defense Logistics Agency". DLA.mil. Retrieved 5 August 2016.*

2. *"European Federation of National Maintenance Societies". EFNMS.org. Retrieved 5 August 2016. All actions which have the objective of retaining or restoring an item in or to a state in which it can perform its required function. These include the combination of all technical and corresponding administrative, managerial, and supervision actions.*

3. *Ken Staller. "Defining Preventive & Predictive Maintenance".*

4. *"MRO – Definition". RF System Lab*

5. *Micharl Decourcy Hinds (February 17, 1985). "Preventive Maintenance: A Checklist". The New York Times.*

Erik Sandberg-Diment (August 14, 1984). "Personal computers preventive maintenance for an aging computer". NYTimes.com

Textile chemical processing

Level II

Learning Guide-29

Unit of Competence: Perform minor maintenance

Module Title: Performing minor maintenance

LG Code: IND CHP2 M09 L02-LG29

TTLM Code: IND CHP2 TTLM9 0919v1

LO 2: Rectify minor machine fault

Instruction Sheet	Learning Guide # 29

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

LO2 Rectify minor machine fault

2.1 Identifying and addressing minor machine, equipment and tool faults

2.2 Identifying and documenting major machine or product faults

2.3 Completing maintenance records and its documentations

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

- Identify and addressee Minor machine , equipment and tool faults
- Identify and document Major machine or product faults.
- Accurately complete Machine maintenance records and other documentation.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3,
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, and Self-check 4.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 and Operation Sheet 2”
6. Do the “LAP test” (if you are ready).

Information Sheet-1	Identifying and addressing minor machine, equipment and tool faults

Introduction

Maintenance is work that is carried out to preserve an asset (such as a roof or a heating boiler), in order to enable its continued use and function, above a minimum acceptable level of performance, over its design service life, without unforeseen renewal or major repair activities.

Maintenance and repair unscheduled and scheduled deficiencies during the time period in which they occur. Maintenance is the function of keeping items or equipment in, or restoring them to, serviceable condition. It includes servicing, test, inspection, adjustment/alignment, removal, replacement, reinstallation, troubleshooting, calibration, condition determination, repair, modification, overhaul, rebuilding and reclamation.

Maintenance is not only repair or planned, preventive action but also improvement and modification of equipment.

Planned preventive maintenance can be divided in to three main parts depending on the volume of work and the duration between repairs

- **Minor fault repair**
- **Medium fault repair**
- **Major overhaul.**

Some of Minor machine, Equipment and Tool faults

- damaging bolts, keys and worn parts;
- Dusting of key ways
- burrs from journals, bushes, and gear teeth;
- damaging of guards and protection devices;
- Crack machine parts
- Dirty machine parts
- poor lubrication(oiling)
- poor electrical connections

Work to be done during minor repair: -

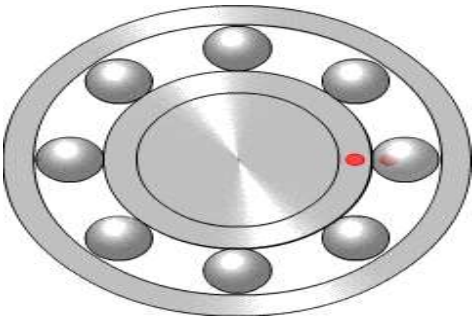
- Replacement of damaged bolts, keys and worn parts;
- Cleaning and truing of key ways
- Filing of burrs from journals, bushes, and gear teeth;
- Mending or repairing of guards and protection devices;
- Welding of cracks.
- And all other minor maintenance activities mentioned under routine work

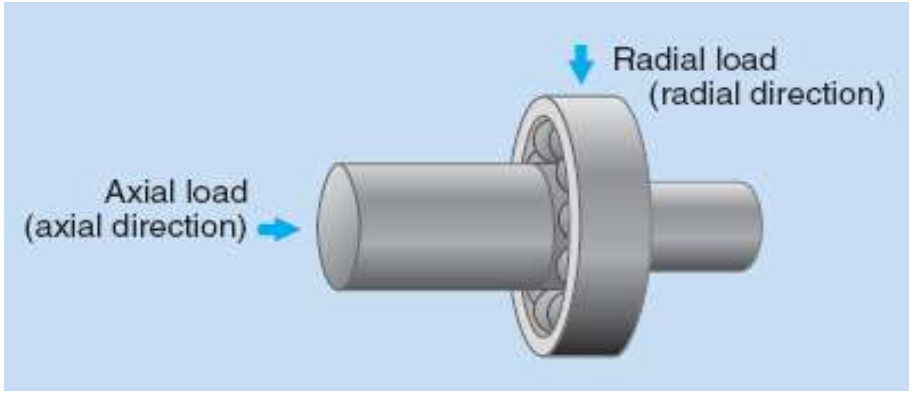
- The total volume of minor repair in any period is about 20% of the volume of work of planned major over hauls.

  The scale of work is determined from facts:

  - Inspection report
  - Manufacturers recommendation
  - Experience
  - Design modification

Gear **Bearing**





Bearing

Self-Check -1	Written Test

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

Choose the best answer

1. Which one of the following work to be done during minor repair?(2 point)

A. Cleaning and truing of key ways

B. Replacement of damaged bolts, keys and worn part

C. Welding of cracks.

D. All

E. None

2. Which one of the following is minor machine Fault? (2 point)

A. damaging bolts, keys and worn parts

B. burrs from journals, bushes, and gear teeth

C. poor lubrication (oiling)

D. A&C E. All

Short answer questions

1. Write at least 4 minor machine faults .(**4 points**)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Identifying and documenting major machine faults

Major machine faults

- Damaging of Gear teeth
- Damaging of Rolling contact bearing
- Damaging of journal
- Damaging of flexible coupling
- main motor faults
- Cracking of machine base plate
- Machine leveling Problems
- Unfixed precision units
- Problems of Accuracy, power and capacity of the machine

Work to be done during major repair: -

- Replacement or reconditioning of worn parts and assemblies including base plates.
- All levels are checked and fixed
- All precision units are gauged and fixed.
- Reassemble and testing. Dry running…
- Accuracy, power and capacity of the machine are checked.
- Delivered to normal operation.
- Replacement of damaging gear, journal and flexible coupling
- Checking and reconditioning motors

Documentation of major machine faults

Complete, thorough, and current documentation is essential to an effective maintenance program. Whether you are performing preventive, predictive, or reliability-centered maintenance, keeping track of equipment condition and maintenance performed or planned is critical.

Regular maintenance and emergency maintenance must be well documented, as should special work done during overhauls and replacement.

- **Scheduling**
    - An annual inventory of all equipment is completed and documented along with a planned preventive maintenance, repair anticipation and long-range replacement plan
    - Based on the inventory, a calendar is developed that guides the PM staff in completing timely servicing and maintenance of all equipment. The calendar lists the PM due on a daily, weekly, monthly, and annual basis
    - Assessed fixtures and equipment includes items owned by the facility, supplied by a vendor, leased, or rented
    - The Preventive Maintenance is completed in accordance with the defined procedure. When manufacturer's guidelines are available, PM is completed in accordance with the manufacturer's guidelines.
- **Record Keeping**
    - A separate file or tabbed section of a notebook is designated for each piece of equipment requiring PM. Cover material will include the maintenance procedure for each fixture or piece of equipment, as well as any instructional manuals. The required parts and material list will also be noted
    - The file or tabbed section includes a fixture/equipment-specific log to document maintenance completion. The record notes whether PM is provided and whether any problems in servicing were identified. If problems are identified, the corrective action taken is recorded
    - In the event that maintenance cannot be completed, the reason is noted along with the action plan for completion

Self-Check -2	Written Test

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

Choose the best answer

1. Which one of the following work to be done during major repair? (2 point)

A. All levels are checked and fixed

B. Accuracy, power and capacity of the machine are checked.

C. A& B

D. All

2. Which one of the following is major machine fault? (2 point)

A. Damaging of Gear teeth B. main motor faults C. All D. None

Short answer question

3. Define record keeping? (2 point)

4. Write at least 3 major machine fault? (3 point)

Note: **Satisfactory rating – 5.5&above points** **Unsatisfactory - below 5.5 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Completing maintenance records and its documentations

Define Maintenance record

A type of paper records a list of the necessary and vital maintenance that is required to be completed by a maintenance person. The status and closure of the task when it is completed.

A maintenance record is a helpful tool to assign tasks to a maintenance person and update other members of a team in relation to any type of maintenance that has been recorded and track the status of the record until it is completed.

What should be recorded?

- The details of repair work done on each machine (including cause/suspected cause, and who carried out the repair)
- The spare parts and materials used
- The date equipment has broken down, and the date it is repaired.
- The causes of any delay.

6 Advantages of keeping an equipment maintenance record

- *Prevent expensive repair works from happening*
- *Helps you create specialized maintenance programs*
- *Prevent problems regarding warranty claim*
- *It increases the safety of operators*
- *Helps you track who is accountable for a piece of equipment*
- *It increases the resale value of the equipment*

Self-Check -3	Written Test

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

Short answer questions

1. Write at least 3 Advantages of keeping an equipment maintenance record?(3 point)
2. What should be recorded in maintenance? (5 point)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet- 1	identifying minor machine fault

Procedure for identifying minor machine fault

Steps 1- plan for identify minor faults

Step 2- Observe the machine

Step 3- Inspect the machine

Step 4- Find out a minor machine faults

Step 5- List and record minor faults

Operation Sheet-2	Identifying and documenting major machine fault

Procedure for Identifying and documenting major machine fault

Steps 1- Plan for identify major machine faults

Step 2- Inspect the machine

Step 3- Disassemble the whole machine parts

Step 4- Find out major machine faults

Step 5- List and record major machine faults

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within -24-36-- hour.

Task 1. Identifying minor machine fault

Task 2. Identifying major machine fault

List of Reference Materials

1.*Ken Staller. "Defining Preventive & Predictive Maintenance".*

2. *"MRO – Definition". RF System Lab*

3. *Micharl Decourcy Hinds (February 17, 1985). "Preventive Maintenance: A Checklist". The New York Times.*

Erik Sandberg-Diment (August 14, 1984). "Personal computers preventive maintenance for an aging computer". NYTimes.com

Textile chemical processing

Level II

Learning Guide#30

Unit of Competence: Perform Minor Maintenance

Module Title: Performing Minor Maintenance

LG Code: IND CHP2 M09 L03-LG30

TTLM Code: IND CHP2 TTLM9 0919v1

LO 3: Clean and lubricate machine

Instruction Sheet	Learning Guide # 30

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

LO3 Clean and lubricate machine

3.1 Machine Cleaning OHS practices

3.1.1 Hazard identification and control

3.1.2 Risk assessment

3.1.3 Risk reduction measures implementation

3.1.3.1 Manual handling techniques

3.1.3.2 standard operating procedures

3.1.3.3 personal protective equipment

3.1.3.4 safe materials handling

3.1.3.5 Taking of rest breaks

3.1.3.6 Ergonomic arrangement of workplaces

3.1.3.7 Following marked walkways

3.1.3.8 Safe storage of equipment

3.1.3.9 Housekeeping

3.1.3.10 Reporting accidents and incidents

3.1.3.11 Environmental practices

3.2 Cleaning Machine

3.3 Lubricating machine

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

- clean Machine according to OHS practices and schedules
- lubricate Machine according to workplace requirements and schedules,

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3,
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, and Operation Sheet 3 ”
6. Do the “LAP test” (if you are ready).

Information Sheet-1	Machine Cleaning OHS practices

Introduction

Occupational Health and Safety practices

occupational safety and health (**OSH**), also commonly referred to as **occupational health and safety** (**OHS**), **occupational health**, or **workplace health and safety** (**WHS**), is a multidisciplinary field concerned with the safety, health, and welfare of people at work.

The goals of occupational safety and health programs include to foster a safe and healthy work environment. OSH may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment.

1.1. Hazard identification and control

- Hazard is any substance or agent that can cause potential health effect and it can be biological, chemical, physical substances.
- **Hazard identification** – is the process of finding, listing, and characterizing hazards.
- The work environment in the textile mills is dominantly harmful or dangerous due to noise, dust and heat. Floor are usually dirty, the pre spinning stage extremely dust and the finishing stage toxic with highly concentrated odors.
- During textile processing the worker are exposed to various hazards and risks.

Types of Hazards

A. physical Hazards: - Physical hazards can be any factors within the environment that can harm the body without necessarily touching it. for example heat, dust, noise, physical characteristics of material.

B. Chemical Hazards: - Are present when a worker is exposed to any chemical preparation in the workplace in any form (solid, liquid or gas). Some are safer than others, but to some workers who are more sensitive to chemicals, even common solutions can cause illness, skin irritation, or breathing problems. Toxic chemicals used in fabric processing. E.g. sulphuric acid, caustic soda, and any other toxic chemicals.

C. Ergonomics: - for example increased repetitious, seated for long period of time, poor arrangement of machine, lifting large load.

D. Psychosocial factor: - include boring, stress, low pay, lack of recognition, production pressure and repetitious task.

1.2 Risk assessment

What is a risk assessment?

Risk assessment is a term used to describe the overall process or method where you:

- Identify hazards and risk factors that have the potential to cause harm (hazard identification).
- Analyze and evaluate the risk associated with that hazard (risk analysis, and risk evaluation).
- Determine appropriate ways to eliminate the hazard, or control the risk when the hazard cannot be eliminated (risk control)

Proper handling including the collection, transport, processing recycling or disposal of waste materials produced by human actively in order to reduce their negative effect on the environment.

Steps of Risk assessment

The legal requirement for risk evaluation or assessment applies to all employers. The process for carrying out a risk assessment can be broken down into a series of steps:

Step 1 Identifying hazards and those at risk

Step 2 Evaluating and prioritizing risks

Step 3 Deciding on preventive action

Step 4 Taking action

Step 5 Monitoring and reviewing

1.3. Risk reduction measures implementation

Specifically to this competence Risk reduction measures implementation may include. Manual handling techniques, Standard operating procedures, Personal protective equipment , Safe materials handling, Taking rest breaks, Ergonomic workplaces

arrangement , Following marked walkways, Safe equipment storage, Housekeeping, Reporting accidents and incidents and Environmental practices. These are explained as follow.

1.3.1 Manual handling technique

What is Manual Handling?

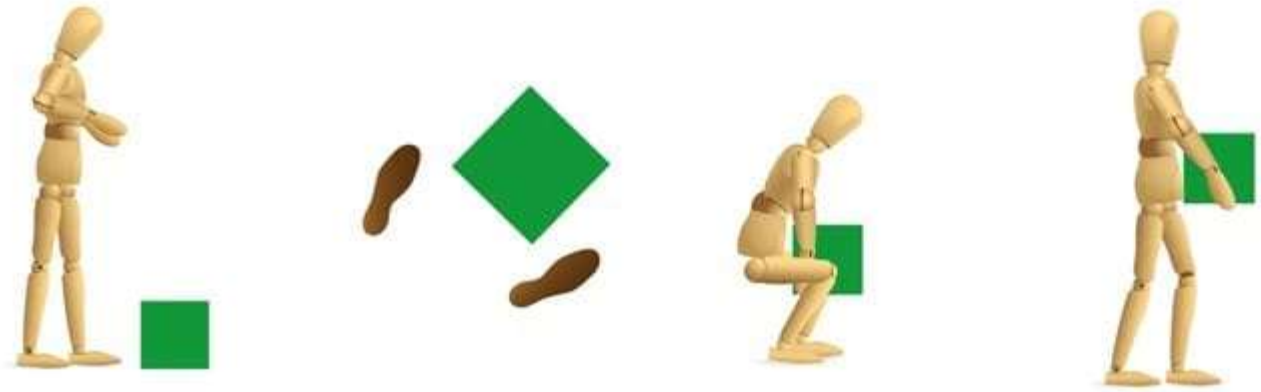
Moving and handling, also known as ‘manual handling’, is any action involving physical effort to move or support an object or person by:

- Lifting
- Pushing
- Pulling
- Maneuverings
- Steadying
- Carrying
- Transporting

By law, employers are required to undertake a risk assessment and do everything that is reasonably practicable in order to reduce the risks associated with manual handling. Amongst other actions, this includes introducing control measures to ensure workers understand how to lift, push and pull correctly, using mechanical aids where available and reducing the need for manual handling altogether

Manual handling accidents, as a result of pushing, pulling or lifting heavy objects or machinery, account for more than a third of all reported accidents each year. This short guide provides the best manual handling techniques to follow in the workplace so that you can reduce the likelihood of injury occurring.

Manual Handling Techniques for Lifting



1. Before lifting an item, think: Can you use a manual handling aid instead? Where is the load being moved to? Are there any obstructions that may get in the way?
2. Adopt a stable position with feet apart and one leg slightly forward to maintain stability. Make sure that you are wearing suitable footwear.
3. Get a good hold on the load and hug it close to your body where possible. At the start of the lift, bending at the back, knees and hips is preferable to fully bending the back or squatting.
4. When carrying, keep the load close to your waist for as long as possible. Put the heaviest side of the load closest to your body. Keep your head up and look ahead, not down at the load, and avoid twisting or leaning sideways.
5. If you need to, put the load down and adjust your grip before continuing the lift.

Pushing or Pulling Loads

When pushing or pulling a load, the Health and Safety Executive provides the following guidance:

- Use an aid with a handle height that is between shoulder and waist height.
- Ensure that pushing or pulling equipment is well maintained.
- As a guide, the amount of force that needs to be applied to move a load over a flat surface is at least 2% of the load weight. For example, if the load is 400kg, then the force needs to be 8kg.

- The force for pushing or pulling will be greater over imperfect conditions.
- Always try to push rather than pull where possible.
- When negotiating a slop or ramp, get help from another worker.
- On an uneven surface, increase the pushing/pulling force to 10% of the load weight.
- To make it easier to push or pull, keep your feet well away from the load and move no faster than walking speed.

1.3.2 standard operating procedures

A standard operating procedure is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations.

It is aimed to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations. Different templates may be used to develop SOP.

1.3.3 personal protective equipment

Personal protecting equipment's are any materials that are used to cover body parts to protect the worker from different disease causing organisms, direct sun radiation and any other physical damages. This equipment's may be provided by purchasing from markets or by making from local materials.

The following are some of personal protecting materials

No	Materials	Description
1		**Body safety cloth (tuta): -** This cloth is a type of cloth which covers all the body part except the head and the fingers**.** It is used to protect the body from dirty.
2		**Sun hat:-** is the material, that is used to protect head from direct sun radiation
3		**Eye protecting device: -** it is used to protect the eye from different damages

4		**Safety shoe:-** it is used to protect foots from hazard chemicals damaging
5		**Hand glove: -** which is made of leather or strong flexible plastic rubber, it used to cover fingers to protect from sharpen materials**, greases, and oils** **Mouse cape:-** it is used to protect mouth from any dirty

1.3.4 Safe materials handling

Material handling can be defined as: art and science of conveying, elevating, positioning, transporting, packaging and storing of materials Starting from the time, the raw material (such as fibers for spinning unit or yarns for weaving/ knitting unit and fabrics for wet processing or garmenting units) enters the mill gate and goes out of the mill gate in the form of finished products; it is handled at all stages within mill boundaries such as within and between raw material stores, various section of production department, machine to machine and finished product stores

Material handling involves the **movement of materials,** manually or mechanically in batches or one item at a time within the plant. The movement may be horizontal, vertical or the combination of these two. A material may be handled even 50 times or more before it changes to finished product.

Proper material handling offers benefits for:

- Improving productivity
- Increasing the handling capacity
- Reducing man-power
- Increasing the speed of material movement
- Reducing materials wastage
- Promoting easier and cleaner handling
- Eliminating idle time of machines, equipment and workers
- Reduce fatigue incurred by the workers
- Increasing safety and minimizing accidents
- Locate and stock material better and in less space
- Minimizing production cost, etc

1.3.5 Taking of rest breaks

An employer should give an employee enough breaks to make sure their health and safety isn't at risk. It is of 3 types:

a. Rest breaks at work,
b. Daily rest and
c. Weekly rest.

a. Rest breaks at work:

Workers have the right to one uninterrupted 20 minute rest break during their working day, if they work more than 6 hours a day. This could be a tea or lunch break.

The break doesn't have to be paid - it depends on their employment contract.

b. Daily rest:

Workers have the right to 11 hours rest between working days, eg if they finish work at 8pm, they shouldn't start work again until 7am the next day.

1.3.6 Ergonomic arrangement of workplaces

Definitions of ergonomics

- Ergonomics is a means of improving working conditions and reducing illness at work
- Ergonomics attempts to 'Fit the Job to the Man' rather than 'Fit the Man to the Job'
- Ergonomics is concerned with the design of systems in which people carry out work
- Ergonomics optimizes Efficiency, Health, Safety and Comfort of people through better designs of products and work places

Basic aims of ergonomics

- Efficiency in purposeful activity
- To achieve desired result without----

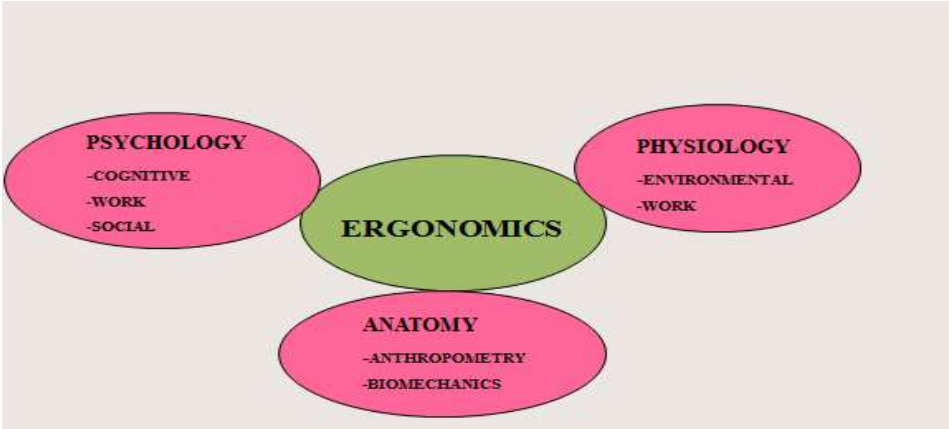
- ✓ Waste
- ✓ Error
- ✓ Damage to persons

Working situation in harmony with the activities of the worker

Ergonomics and Disciplines

- Ergonomics is a Multi-Disciplinary Science
- Ergonomics is also an Inter-Disciplinary Science

Disciplines in ergonomics



Ergonomic needs in a workplace

- **Physical work environment**

Thermal comfort

Noise and vibration control

Adequate and proper lighting

- **Chemical environment**

Control of pollution

General and exhaust ventilation

- **Work physiology**

Control excessive physical load

Avoid physical and muscular fatigue

Adequate rest pauses

Arrangement of static and dynamic work

- **Anthropometry (Body sizes)**

Designs to fit body sizes of users

Appropriate working levels

Adequate work space

Avoid overcrowding of machines and workers

- **Occupational Biomechanics**

Appropriate work postures (sitting, standing)

Safe load lifting and carrying techniques

Adopt proper techniques in manual materials handling

- **Safety and Ergonomics**

Good housekeeping

Performance feedback

- **Systems ergonomics**

Systems groups in problem solving and development work

Participative ergonomics

User centered designs

- **Benefits of ergonomics**

- Higher Productivity
- Product quality
- Protect Health
- Reliability
- Job satisfaction
- Personal development

1.3.7 Following marked walkways

The uses of marked walkways are:

- Separate workers from machines and moving equipment:
- Warn of hazardous areas
- Provide instruction and etc.

Industrial environments can be hazardous, particularly if one is not familiar with the activities. A simple way to stay out of harm's way is to:

- Keep your eyes open
- Observe all signage
- Stay behind barricades
- And use marked walkways at all times

1.3.8 Safe storage of equipment

Create a plan for storing all equipment and materials at your site. Assign a specific location to each item or type of item and label the space accordingly. Make certain that work areas and walkways are kept clear of all stored items. Use tape or paint to identify such areas on the floor of a large area, such as a manufacturing facility. In an office, laboratory or similar smaller setting, use cabinets with doors that close securely. Always

leave at least 1.5 feet between the top of stored items and fire sprinklers, if present. Make sure that all stacks are solid and secure them whenever possible.

1.3.9 Housekeeping

Housekeeping refers to the management of duties and responsibilities involved in the running of a household, such as cleaning, cooking, home maintenance, shopping, laundry and any activities performed in house. These tasks may be performed by any of the household members or by other persons hired to perform these tasks. The term is also used to refer to the money allocated for such use.

1.3.10 Reporting accidents and incidents

Accidents and unexpected incidents at work are something you try to avoid. But they can happen. This all starts, with reporting. Employees should report all accidents and incidents to their employer by filling to the accident book. Employers should investigate all reports and notify their insurance company.

Accident reports can be used to:

- Gather information
- Identify problems
- Prevent it from happening again
- Provide training
- Improve management skills
- Comply with legal requirements and etc.

In any case, it's best to report and investigate accidents quickly. You can get more information while the incident is fresh in everyone's minds. And, the quicker you act to fix any problems found, the less risk of it happening again.

1.3.11 Environmental practices

The term best environmental practice means the application of the most appropriate combination of environmental control measures and strategies. These may include: recycling and re-use; saving resources, avoiding the use of hazardous substances and etc.

Self-Check -1	Written Test

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

Short answer questions

1. Define OHS? (2 point)

2. Write the benefit of Ergonomics? (2 point)

3. Write at least 4 risk reduction and measurements methods? (4 point)

4. List personal protective equipment?(5 point)

Note: **Satisfactory rating – 6.5&above points** **Unsatisfactory - below 6.5 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Cleaning Machine

Introduction

Cleaning is the process of removing unwanted physical substances such as dirt, infections agents and other impurities from an object or any machine or environment.

The cleaning of an industrial machine is an issue of fundamental importance for the proper functioning of an organization and not only that but it will help you in reducing expenses.

Benefits of cleaning machine and equipment

- Improve machine and equipment performance
- Increase the life span of the machine
- Increase machine reliability
- Reduce service downtime

Cleaning occurs in many different contexts and uses many different methods

- Large- size machine parts (stands, Frameworks) are cleaned with hand and mechanized brushes or by blowing with compressed air or by means of an industrial type vacuum cleaner.
- Interior threads in these parts are cleaned with a brass wire bent as a loop with loose

Pointed ends.

- Cleaning of small parts by scrapers, hooks, and rags is inefficient and of low quality.

In this case it is more expedient to use special cleaning devices and brushes.

- Steel and cast iron parts are cleaned by metal brushes of low carbon steel wire, while for brass parts brushes of brass wire are to be used.
- Brushes of fiber cord or other synthetic materials are used for cleaning the parts from burrs and small rust as well as for eliminating dirt remained after washing.

- The cleaning efficiency may be two or three times increased by using an electric polishing machine with an induction high- frequency motor which is provided with a metal brush.
- Using an electric polishing machine the impurities are destroyed by electric discharge and mechanical action of the brush.

Beside that there are many other types of cleaning machines applied.

Such as - **Stationary cleaning machine**

- **Conveyer type cleaning machine**

Self-Check -2	Written Test

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

Short answer questions

1. Write the benefit of machine and equipment cleaning? (4 point)
2. Explain at least 3 types of machine cleaning equipment? (3 point)
3. What is cleaning? (2 point)

Note: **Satisfactory rating – 4.5&above points** **Unsatisfactory - below 4.5 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Lubricating machine

Lubrication

A lubricant is a substance that reduces friction between two surfaces in relative motion. Lubricant works by separating two surfaces that are in relative motion & reducing the friction between them.

This **prevents the stronger surface** from removing particles from the weaker surface.

The basic purposes of lubrication are to:

- Reduce friction
- Reduce wear
- Dampen shock
- Cool moving elements
- Prevent corrosion
- Seal out dirt

Friction and wear

- **Friction** is the **resistance to any relative motion** between two surfaces in contact.
- **Wear** is the **gradual removal of material from a surface** due to excess friction.

The Types of Lubrication

Lubrication can be divided into three types:

1. Oil
2. Grease
3. Solid lubrication.

1. Oils the most common type of lubricant used in manufacturing industry is oil.

Most of the oil in manufacturing is mineral oil which comes from refined petroleum.

Advantages of using oils

- Stable
- Can be cleaned & filtered
- Easy to drain & re –fill
- Used at any machine speed

Oil

Draw backs of oil

- Difficult to control at specific applications
- Tendency to change its properties at high temperature

2. Grease

- Grease is not a fluid it is semi-solid
- Grease is created by combining oil with thickening agent or additives

Advantages

- Easy to control & stay in place once applied
- Withstand heavy load

Draw backs

- Cannot with stand high m/c temp. & speed
- Not easily cleaned & filtered
- Heaver the grease the more power the m/c to move.

3. Solid lubricant

Solid lubricant applied in powder form

E.g. graphite powder

Solid lubricant with stand high temperature

It coat pots to create non-stick cooking surface

E.g. size cooker

Advantages of solid lubricant

- Solid lubricant bond well with the surface material forming strong film.
- Relatively clean while oils & grease absorb dirt & contaminates.

Draw backs

- Not suitable for all applications
- Do not conduct heat
- Do not prevent friction & wear

Effect of Lubricant

- Corrosion (anti corrosion effectiveness)
- Uniformity & optimum speed attainment
- Recommended legibility of the spares & parts
- High efficiency (due to low break down stoppage of the material)
- Higher quality of the product
- Low work load on the work arm
- Less material handling

Self-Check -3	Written Test

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

1. Define lubricant? (**2points**)
2. Write the types of lubrication? (3 point)
3. Explain the basic purpose of lubrication? (5 point)
4. What is friction? (2 point)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet-1	Machine cleaning OHS practice

Procedure of OHS practice

Step 1- understand the standard machine cleaning

Step 2- identify hazards and risks during cleaning

Step 3- wear personal protective equipment for cleaning

Step 4- store the cleaning equipment safely

Step 5- use proper cleaning material handling techniques

Operation Sheet-2	Lubricating machine

Procedure for machine lubrication

Step 1- clean the machine before lubrication

Step 2-**Check oil level and top off as necessary**

Step 3- Add oil in low speed rotation machine parts (spindles, bearing)

Step 4- add **Grease on the motor bearing**

Step 5- Add grease on withstand heavy loads machine parts (gear, shafts)

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within -2-4 hour.

Task 1- apply OHS practice

Task 2- perform machine lubrication

List of Reference Materials

1. 1.https://www.osha.gov/shpguidelines/hazard-prevention.html
2. 2.http://www.worksafeforlife.ca/Portals/worksafeforlife/CareerColleges/WCBNS_https://w 3.ww.westernsydney.edu.au/__data/assets/pdf_file/0020/12917/12917_Hazard_Identification,_Risk_Assessment_and_control_Procedure.pdf
3. https://www.bing.com/search?q=personal+protective+equipment&form
4. https://www.gov.uk/rest-breaks-work
5. https://www.haspod.com/blog/management/reporting-accidents-incidents-at-work
6. https://www.haspod.com/blog/management/reporting-accidents-incidents-at-work
7. 8.*Ken Staller. "Defining Preventive & Predictive Maintenance".*
8. *"MRO – Definition". RF System Lab*
9. *Micharl Decourcy Hinds (February 17, 1985). "Preventive Maintenance: A Checklist". The New York Times.*

10.Erik Sandberg-Diment (August 14, 1984). "Personal computers preventive maintenance for an aging computer". NYTimes.com

Textile Chemical Processing

Level II

Learning Guide-31

Unit of Competence: Perform Minor Maintenance

Module Title: Performing Minor Maintenance

LG Code: IND CHP2 M09 L04-LG31

TTLM Code: IND CHP2 TTLM9 0919v1

LO 4: Check machine operation

Instruction Sheet	Learning Guide # 31

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

- Checking machine operation

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

- Check Machine to ensure correct operation.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1,
4. Accomplish the “Self-check 1,
5. If you earned a satisfactory evaluation from the “Self-check”. proceed to “Operation Sheet 1
6. Do the “LAP test” (if you are ready).

Information Sheet-1	Checking machine operation

1.1. Check machine performance

Monitor and review Machine performance and adjustments made as required, in accordance with manufacturer specifications and ***OHS practices.*** *Monitor m*achine operations and processes to ensure correct procedures are assessed and product meets quality standards & consult machine operator to assess machine operations and processes.

1. Identify problems with machine operation

Identify **Symptoms** of machinery fault & Visual inspection of machine and product is used to locate fault.

Symptoms may include:

- product does not meet specification
- machine is not operating to specification
- sounds not attributed to normal operation
- Current faults such as yarn breaking, etc.

Locate fault within section or component of machine & refer operating manuals or documentation as required.

1.3. Determine problem cause and solution

Determine possible causes of problem & gather further information to confirm or eliminate possible cause. Consult ***appropriate personnel*** to confirm cause.

Appropriate personnel may include:

- Textile mechanic
- Supervisor
- Senior operator

Determine and trial or implement ***immediate solution.*** Determine Permanent solution in consultation with appropriate personnel.

Immediate solution: A solution to the problem that will control immediate undesirable impacts, but which may not eliminate the root cause of the problem.

Permanent solution: A solution to the problem that will eliminate the root cause of the problem.

Immediate solution may include:

- Decommission machine
- Change settings
- Adjust operation
- Perform temporary fix
- Refer to textile mechanic

1.4.Conduct routine checks of performance efficiency

- Assess routine checks of machine performance against production specifications in accordance with manufacturer instructions. Check and assess ***Preventative maintenance*** strategy for machine in accordance with manufacturer instructions &assess ***Periodic servicing*** such as lubrication and greasing,

1.5. Perform preventative maintenance procedures

- Past and current maintenance practices in both the private and government sectors would imply that maintenance is the actions associated with equipment repair after it is broken. The dictionary defines maintenance as follows: “the work of keeping something in proper condition; upkeep.” This would imply that maintenance should be actions taken to prevent a device or component from failing or to repair normal equipment degradation experienced with the operation of the device to keep it in proper working order.

The benefit of checking machine operation

- **Save money on repairs**
- **Protect your machine**
- **Keep employees safe**
- **Better Understanding of Machinery**

Self-Check -1	Written Test

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

Short answer questions

1. Write the immediate solution of machine operation problem? (4 point)
2. Explain the problems during machine operations?(5points)
3. Write the benefit of checking machine operation? (4 point)

Note: **Satisfactory rating – 6.5&above points** **Unsatisfactory - below 6.5 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Operation Sheet-1	Checking machine operation

Procedures for checking machine operations

Step 1-Check the machine control panel

Step 2-Check the machine operation sound

Step 3- Check the machine operation adjustment

Step 4- Check the machine speed

Step 5- Check the temperature

Step 6- Check the starting and stopping button

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 30minute.

Task 1- Checking machine operations

List of Reference Materials

1. *"Defense Logistics Agency". DLA.mil. Retrieved 5 August 2016.*

2. *"European Federation of National Maintenance Societies". EFNMS.org. Retrieved 5 August 2016. All actions which have the objective of retaining or restoring an item in or to a state in which it can perform its required function. These include the combination of all technical and corresponding administrative, managerial, and supervision actions.*

3. *Ken Staller. "Defining Preventive & Predictive Maintenance".*

4. *"MRO – Definition". RF System Lab*

5. *Micharl Decourcy Hinds (February 17, 1985). "Preventive Maintenance: A Checklist". The New York Times.*

Erik Sandberg-Diment (August 14, 1984). "Personal computers preventive maintenance for an aging computer". NYTimes.com