



INDUSTRIAL ELECTRICAL MACHINES AND DRIVES SERVICING Level II

LEARNIG GUIDE # 34

**Unit of competence: Industrial Electrical Machines
and Drives Servicing Level II**

**Module Title: Maintaining and repairing industrial
electrical machines and drives**

LG Code: E EEL EMD2 M08LO5-LG 34

TTLM Code: EEL EMD2 TTLM091019V1

LO5: clean- up



Instruction Sheet	Learning Guide
--------------------------	-----------------------

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

- Clean ,check and return tools, equipment and any surplus materials
- Check and maintain tools and equipment
- Cleaning work area

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

- Clean ,check and return tools, equipment and any surplus materials
- Check and maintain tools and equipment
- Cleaning work area

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 and 4.
3. Read the information written in the “Information Sheet 1, Sheet 2, Sheet 3, in page 3, 5 and 8 respectively”.
4. Accomplish the “Self-check 1, Self-check 2 and Self-check 3” in page 4, 7 and 12 respectively”.



Information Sheet-1	Clean ,check and return tools, equipment and any surplus materials
----------------------------	---

Fundamentals for Returning surplus materials ware house

- All surplus materials should be identified, inspected, labeled, transferred to another project or returned to Logistics. This can take place during project execution or after project completion and/or cancellation.
- All materials planned for return shall be segregated and transferred to relevant storage facility in accordance with the following criteria:
- Items which have potential use but not part of 'general stock' (standard materials) and where required, having shall be returned to surplus storage facilities.
- Items which have potential use and are part of 'general stock' and where required, having shall be returned to standard stock storage facilities.
- All other materials should be sent to auction yards within the respective area, flagged for disposal and disposed through sale to other operators or auctioned via public tender.
- Any item that can be immediately used on another approved project or transferred to general stock shall be transferred to the next approved project at the original procurement cost.
- Surplus materials should be properly marked, labeled and preserved at all time in accordance with procedures and guidelines



Self-Check -1	Written Test
----------------------	---------------------

Directions: Answer all the questions listed below. Choose the best answer.

1. All materials planned for return shall be segregated and transferred to relevant storage facility in accordance with the following criteria:
2. Items which have potential use and are part of 'general stock' and where required, having shall be returned to standard stock storage facilities

Note: Satisfactory rating – 1 points

Unsatisfactory - below 1 points

Score = _____

Rating: _____

Name: _____

Date: _____



Information Sheet-2	Check and maintain tools and equipment
----------------------------	---

2.1. Tool Work Habits

2.1.1. Keep each tool in its proper storage place.

All divisions have incorporated a Tool Control Program as directed. The Tool Control Program is based on the concept of a family of specialized toolboxes and pouches configured for instant inventory before and after each maintenance action. The content and configuration of each container is tailored to the task, work center, and equipment maintained.

- ✓ Work center containers are assigned to and maintained within a work center. Other boxes and specialized tools are checked out from the tool control center (tool room).
- ✓ Keep your tools in good condition. Protect them from rust, nicks, burrs, and breakage.
- ✓ Keep your tool allowance complete.
- ✓ When you are issued a toolbox, each tool should be placed in it when not in use. When the toolbox is not actually at the work site, it should be locked and stored in a designated area.

2.1.2. Use each tool only for the job it was designed to do.

Each particular type of tool has a specific purpose. If you use the wrong tool when performing maintenance or repairs, you may cause damage to the equipment you're working on or damage the tool itself. Remember, improper use of tools results in improper maintenance. Improper maintenance results in damage to equipment and possible injury or death to you or others.

2.1.3. Safe maintenance practices

Always avoid placing tools on or above machinery or an electrical apparatus. Never leave tools unattended where machinery is running.



2.1.4. Never use damaged tools.

Abused screwdriver may slip and spoil the screw slot, damage other parts, or cause painful injury. A gauge strained out of shape will result in inaccurate measurements.

Remember, the efficiency of craftsmen and the tools they use are determined to a great extent by the way they keep their tools. Likewise, they are frequently judged by the manner in which they handle and care for them. Anyone watching skilled craftsmen at work notices the care and precision with which they use the tools of their trade. The care of hand tools should follow the same pattern as for personal articles; that is, always keep hand tools clean and free from dirt, grease, and foreign matter. After use, return tools promptly to their proper place in the toolbox. Improve your own efficiency by organizing your tools so that those used most frequently can be reached easily without digging through the entire contents of the box. Avoid accumulating unnecessary junk.

2.2. Care of hand tools

Tools are expensive; tools are vital equipment. When the need for their use arises, common sense plus a little preventive maintenance prolongs their usefulness. The following precautions for the care of tools should be observed:

- ✓ Clean tools after each use. Oily, dirty, and greasy tools are slippery and dangerous to use.
- ✓ NEVER hammer with a wrench.
- ✓ NEVER leave tools scattered about. When they are not in use, stow them neatly on racks or in toolboxes.
- ✓ Apply a light film of oil after cleaning to prevent rust on tools.
- ✓ INVENTORY tools after use to prevent loss.



Self-Check -2	Written Test
----------------------	---------------------

Directions: Answer all the questions listed below.

PART I TRUE/FALSE

If the statement is correct write TRUE if the statement is incorrect write FALSE

- _____ 1. Keep your tools in good condition. Protect them from rust, nicks, burrs, and breakage.
- _____ 2. Always avoid placing tools on or above machinery or an electrical apparatus.
- _____ 3. Remember, improper use of tools results in improper maintenance.
- _____ 4. Use each tool only for the job it was designed to do.

Note: Satisfactory rating - 2 points

Unsatisfactory - below 2 points

Score = _____
Rating: _____

Name: _____

Date: _____



Information Sheet-3	Clean work area
----------------------------	------------------------

Work station is defined as an area, in an office, outfitted with equipment and furnishings for one or more workers. Normally leather goods are operated in a work shop therefore the work station for a leather goods worker would be the workshop. It is necessary for a worker to prepare his work station and the pieces to be done but before doing so a worker should be well aware of the safety rules and regulations.

3.1. Housekeeping

Good housekeeping involves every phase of industrial operations and should apply throughout the entire premises, indoors and out. It is more than mere cleanliness. It requires orderly conditions, the avoidance of congestion, and attention to such details as an orderly layout of the whole workplace, the marking of aisles, adequate storage, and suitable provision for cleaning and maintenance. Efficient production and a good working environment are complementary. The elimination of inefficiencies and accident hazards caused by unfavorable conditions in and about the workplace is essential in getting the job done properly and safely. The attention to these important details which may be overlooked when management's attention is concentrated upon such amenities as good cloakrooms, canteens, rest rooms, recreational facilities, etc. is widely referred to as "good housekeeping."

A clean, well-ordered, attractive work environment sets the tone of your establishment. It encourages tidy work habits in employees. It helps reduce fatigue. It promotes good worker management relations. It also gives a lift to morale, which is reflected in the quality of production and overall efficiency. Good housekeeping is also a good advertisement for your company. Customers and clients have more confidence in an organization when they see work being carried out efficiently in clean, pleasant, well-ordered surroundings. There's an even more important reason why good housekeeping matters it makes the undertaking a safer place to work in.

Good housekeeping is a vital factor in preventing accidents. The great majority of all work accidents are caused during the handling of goods or materials, and by people falling, being hit by falling objects, or striking against objects in the workplace. All these causes can be reduced by good housekeeping practices. In fact, good housekeeping is the only cure for hundreds of accidents that occur. Here are some kinds of accidents commonly caused by *bad* housekeeping:



- Tripping over loose objects on floors, stairs and platforms
- Articles dropping from above
- Slipping on greasy, wet or dirty surfaces
- Striking against projecting, poorly stacked, or misplaced material
- Tearing the hands or other parts of the body on projecting nails, wire, steelstrapping on bales or crates, etc.

Typical examples of poor housekeeping that lead to these accidents are:

- Excessive material, waste or chips in the working area
- Congested aisles
- Tools left on machines
- Waste containers overflowing
- Lockers and workrooms in disorder
- Acids in open containers
- Broken glass
- Electric leads or air lines across aisles
- Dirty light fittings, windows and skylights

Where housekeeping is bad, fire is a constant hazard. It can be caused by many housekeeping problems such as oil-soaked rags and clothing igniting from spontaneous combustion, dust collectors not being properly or frequently cleaned, or piles of paper and other packing materials being allowed to accumulate. Poor keeping can also lead to infestation by pests such as rodents and cockroaches and create serious health risks.

3.2. Elements of a Good Housekeeping

The following are the basic elements of a good housekeeping:

- **Passageways:** Wide enough for traffic movements, marked off by floor lines from workpositions and storage areas.
- **Space:** Insuring sufficient room for the individual to work.
- **Storage:** Adequate and convenient space for materials and tools.
- **Materials Handling:** Layout planned for materials flow, with efficient methods and equipment.
- **Ventilation:** Good general ventilation plus local exhaust ventilation to remove air contaminants at the source.



- **Floors and Walls:** They need to be constructed with materials that are easy to clean and if needed easy to repair.
- **Lighting** Well distributed artificial light and effective use of available daylight.
- **Amenities:** Clean, up-to-date washrooms and lockers for clothing, and clean and inviting lunch room for employees to eat their meals.
- **Waste Removal:** Adequate facilities to prevent congestion and disorder.

Let us look at some of these elements in detail:

Keep Passageways Clear: Passageway space should be reserved for the movement of personnel, products and materials. It should be kept clean and clear and should never be used for “bottleneck” or “overflow” storage. This also applies to passageways and emergency exits. Blind corners should be eliminated or be adequately protected by warning signs. Aisle boundary markings should be drawn to show clearly the space which has been reserved for traffic. Markings should be sufficiently wide (say a minimum of 30 mm) and of a color to make them clearly visible. Paint or durable plastic strips can be used.

Improve Storage Facilities: Tidiness and order are essential in overcoming storage problems, both in storerooms and in the yard. Good storage utilizes airspace instead of floor space, and also saves time-wasting delays. It’s important to prevent stores and scraps accumulating on the floor and around machines. Never keep more stores and materials than necessary near machines and provide proper facilities (such as bins, shelves, boxes, racks, etc.) in which to store them.

Keep Floors Clean: Every year thousands of work injuries are caused by people falling. Floor conditions are responsible for many of these accidents. When floors are given the right treatment they are much easier to keep clean and hygienic. Spilt oil and other liquids should be cleaned up at once. Chips, shavings, dust, and similar wastes should never be allowed to accumulate. They should be removed frequently, or better still, be suitably trapped before they reach the floor.

Paint the Walls: Paint is one of the cheapest means of renovating walls, and a fresh coat of paint can give a boost to morale. Light-colored walls reflect light. Dirty or dark-colored walls absorb light. Dirty walls have a depressing effect and encourage dirty habits and sloppy attitudes. Choose suitable colors to paint walls, ceilings and working surfaces. See that the paintwork is cleaned down periodically. Color can be harnessed to assist with safety. For example it can be



used to warn of physical hazards and to mark obstructions such as pillars. Painting handrails, machine guards and other safety equipment renders them distinctive and also prevents rust. Color can be used to highlight the hazardous parts of machinery but it can never substitute for a needed guard.

Maintain Light Fittings: Attention to light fittings should be an integral part of any good housekeeping programme. Dirty lamps and shades, and lamps whose output has deteriorated with use, deprive employees of essential light. It's been found that lighting efficiency may be improved by 20 to 30 percent simply by cleaning the lamps and reflectors.

Clean the Windows: Clean windows let in light; dirty ones keep it out. Insufficient light causes eye strain and leads to accidents because employees are unable to see properly. Ensure that windows are not blocked by stacked

Dispose of Scrap and Prevent Spillage: It's a common practice to let the floor catch all the waste and then spend time and energy cleaning it up. It is obviously better to provide convenient containers for scrap and waste and educate employees to use them. Safety will benefit, expense will be saved, and the factory will be a better place in which to work. Oily floors are a common accident and fire hazard. Splash guards and drip pans should be installed wherever oil spills or drips may occur. Prevent accidents by keeping oil and grease off the floor.

Get Rid of Dust and Dirt: In some jobs, dust, dirt, chips, etc., are unavoidable. If they can't be collected as part of the process (e.g. by enclosure and exhaust methods) you need a way to clean them up. Vacuum cleaners are suitable for removing light dust and dirt. Industrial models have special fittings for cleaning walls, ceilings, ledges, machinery, and other hard-to-reach places where dust and dirt collect. If light dust is removed by sweeping, floors should be dampened first rather than swept dry. Oiling floors occasionally with light oil helps to lay the dust but take care that slipping hazards do not occur. Remember, it is not only floors that need sweeping. Dust and grime also collect on ledges, shelves, piping, conduits, lamps, reflectors, windows, cupboards, lockers, and so on and all these places need attention.



Self check 3	Written Test
---------------------	---------------------

Directions: Answer all the questions listed below.

PART I TRUE/FALSE

If the statement is correct write TRUE if the statement is incorrect write FALSE

- _____ 1. Good general ventilation plus local exhaust ventilation to remove air contaminants at the source.
- _____ 2. Keep your tools in good condition. Protect them from rust, nicks, burrs, and breakage.
- _____ 3. Always avoid placing tools on or above machinery or an electrical apparatus.
- _____ 4. Remember, improper use of tools results in improper maintenance.
- _____ 5. Use each tool only for the job it was designed to do.

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Score = _____ Rating: _____

Name: _____

Date: _____



List of Reference Materials

1. A. Bellini, F. Filippetti, C. Tassoni, G. A. Capolino, "Advances in diagnostic techniques for induction motors", *IEEE Trans. Energy Convers.*, vol. 55, no. 12, pp. 4109-4126, Dec. 2008.
2. M. J. Devaney, L. Eren, "Detecting motor bearing faults", *IEEE Instrum. Meas. Mag.*, vol. 7, no. 4, pp. 30-50, Dec. 2004.
3. J. Faiz, B. M. Ebrahimi, "Mixed fault diagnosis in three-phase squirrel-cage induction motor using analysis of airgap magnetic field", in *Proc. Prog. Electro-Magn. Res. Symp.*, pp. 239-355, 2006.
4. M. E. H. Benbouzid, "A review of induction motors signature analysis as a medium of faults detection", *IEEE Trans. Ind. Electron.*, vol. 47, no. 5, pp. 984-993, Oct. 2000.
5. Electric Machinery, 6e, Fitzgerald.
6. Principles of electrical machines(mehta)
7. Theraja



The trainers (who developed the Learning Guide)

No	Trainer Name	Education back ground	Region
1	SERKABEBA ABERA	MSC	DEBUB
2	MULU DAMANE	MSC	ADDIAABEBA
3	ABERA GEBRE	BSC	DIRADAWA
4	ESUBALEW AMSALU	MSC	HARER
5	MERON HUSEN	BSC	HARER
6	SHIMELS CHEKOLE	BSC	AMHARA
7	FISIHA BIREHANU	MSC	AMHARA
8	YIMER SEID	MSC	AFAR
9	HINDA IBRAHIM	BSC	SOMALI
10	TADDELE GASHAW	MSC	SOMALI