



LEARN AND WORK ASSIGNMENT (LWA)



NOSS (CODE NOSS)	INDUSTRIAL MAINTENANCE OPERATION (MC-010-3:2012)		
Competency Unit Title (CU CODE)	MACHINE TOOL MAINTENANCE (ELECTRICAL/ ELECTRONIC) MC-010-3:2012-C03	LEVEL	3
Competency Unit Descriptor	<p>Machine tool maintenance (electrical\electronic) is a necessary action for retaining or restoring equipment, machine or system to the specified operable condition to achieve its maximum useful lifespan. It included corrective, preventive and predictive maintenance.</p> <p>The person who is competent in this CU shall be able to Select machine tool to be maintained, Select maintenance requirement, Perform Electronic / Electrical system maintenance, Perform machine functionality test and Produce machine tool maintenance report (electrical / electronic).</p> <p>The outcome of this competency is to provide excellence machine tool (electrical /electronic) maintenance according to machine manual as per company's policy, rules and regulation</p>		
Candidate Name			
Candidate I/C Number			
Company's Name			

CU WORK ACTIVITY STATEMENT:

PERFORM MACHINE TOOL MAINTENANCE (ELECTRICAL/ ELECTRONIC)

ACTIVITIES

DURATION: 212 HOURS**A. SETTING GOAL**

You are required to perform machine tool maintenance (electrical/electronic) activities based on performance criteria below:

- 1.1 Determine type of machine to be maintain in accordance to the machine maintenance schedule.
 - 1.1.1 Milling.
 - 1.1.2 Drilling.
 - 1.1.3 Lathe.
 - 1.1.4 Other type of machine.
- 1.2 Explain machine to be maintain in accordance to the machine maintenance schedule.
- 1.3 Describe job order in accordance with company's policy, rules and regulation.
- 1.4 Determine type of maintenance requirement.
- 1.5 Determine Maintenance type
 - 1.5.1 Preventive.
 - 1.5.2 Corrective.
 - 1.5.3 Predictive.
- 1.6 List maintenance requirement.
- 1.7 Describe electrical drawing
 - 1.7.1 Symbols.
 - 1.7.2 Schematic diagram.
- 1.8 Describe machine tool (electrical/electronic.) maintenance technical manual
- 1.9 List tool and spare parts for machine tool maintenance (electrical/electronic).
 - 1.9.1 Measuring tools.
 - 1.9.2 Special testing tools.
 - 1.9.3 Hand Tools.
 - 1.9.4 Electrical/Electronics parts.
 - Inverter
 - Circuit Control
 - Box-cooler unit
 - 1.9.5 Etc.
- 1.10 Identify electronic / electrical system problem troubleshoot activity
- 1.11 Identify electronic / electrical Control Circuit dismantled activity in accordance with recommended level.
 - 1.11.1 First in/First out
 - 1.11.2 First in/Last out
 - 1.11.3 Last in/First out
 - 1.11.4 Last out/First in
 - 1.11.5 Tagging.
 - 1.11.6 Etc.

- 1.12 Identify electronic / electrical system defects in accordance to maintenance requirement
 - 1.12.1 Vibration
 - 1.12.2 Noise
 - 1.12.3 Temperature
 - 1.12.4 Current
 - 1.12.5 Speed
 - 1.12.6 Air circulation and ventilation
 - 1.12.7 Continuity and insulation
 - 1.12.8 Inverter's Noise
 - 1.12.9 Motor controller malfunction
- 1.13 Identify electronic / electrical maintenance activity
 - 1.13.1 Alignment
 - 1.13.2 Balancing
 - 1.13.3 levelling
 - 1.13.4 adjust
 - 1.13.5 replace
 - 1.13.6 repair
- 1.14 Identify safety procedures adhered in accordance to Standard Operation Procedures.
 - 1.14.1 Safety of machine
 - 1.14.2 safety interlock of equipment.
- 1.15 Identify functionality of the machine.
 - 1.15.1 Free run
 - 1.15.2 Actual test
- 1.16 Identify electronic / electrical report format.
- 1.17 Identify submission documentations to person in charge

B. PLANNING

You are required to plan activities in performing machine tool maintenance electrical/electronic) to achieve setting goal by using resources listed below:

2.1 Identify tools, equipment & materials.

ITEMS	RATIO (TEM : Trainees)
1. Testing instruments	1:1
2. Testing Instrument storage (cabinet)	1:25
3. Machine Electrical/electronic schematic wiring diagram	1:10
4. Milling machine, accessories and consumable item	1:10
5. Drilling machine and accessories	1:10
6. Lathe machine and accessories	1:10
7. Check sheet	1:1
8. Tool box	1:1
9. Hand tool set	1:1
10. Power tools	1:5
11. Personal Protective Equipment (PPE)	1:1
12. Workpiece / Sample for testing	1:1

2.2 Perform machine tool maintenance (electrical/electronic) workflow.

2.3 Identify machine tool maintenance (electrical/electronic) procedures, flow chart and correct sequence.

2.4 Plan duration/time of machine tool maintenance (electrical/electronic) procedures.

2.5 Identify manpower in performing machine tool maintenance (electrical/electronic) activities.

2.6 You may review references as guidelines in performing this activity.

REFERENCES

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3. Ibrahim Che Muda, N Ramudaram, (2004) Teknologi Bengkel Mesin Dewan Bahasa dan Pustaka, Kementerian Pendidikan Malaysia, Kuala Lumpur ISBN 983-62-1233-7
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C. DECISION MAKING

You are required to get coach approval before performing machine tool maintenance (electrical/electronic) activities.

D. EXECUTING & MONITORING

You are required to perform machine tool maintenance (electrical/electronic) activities according to the steps below:

- 3.1 Adhere to Safety procedures and Standard Operation Procedures.
- 3.2 Select machine tool to be maintained electrical/electronic (Single function machine)
 - 3.2.1. Interpret machine's maintenance schedule
 - 3.2.2. Identify types and functions of machines tool
 - 3.2.3. Interpret Job order instructions/ maintenance checklist
 - 3.2.4. Determine company's policy, rules and regulation.
- 3.3 Select maintenance requirement
 - 3.3.1. Preventive
 - 3.3.2. Corrective
 - 3.3.3. Predictive
- 3.4 Perform electrical/electronic system maintenance
 - 3.4.1. Interpret machine tool (electrical/ electronic) maintenance technical manual
 - SOP machine
 - Handbook manual
 - Etc.
 - 3.4.2. Interpret electrical/ electronic drawing
 - Single line drawing
 - Symbol
 - Schematic drawing/diagram
 - Etc.
 - 3.4.3. Select tools for maintenance (electrical/ electronic)
 - Test pen
 - Multimeter (ohm meter, votmeter)
 - Clamp-Amp meter
 - Insulation tester
 - Probe/oscilloscope
 - Etc.
 - 3.4.4. Troubleshoot electrical/electronic component's failure using appropriate testing instrument
 - Check AC Motor condition
 - Check Solenoid Valve
 - Check Motor Starter
 - Check Control Panel
 - Check Transformer
 - Check Speed Controller
 - Check Box-cooler unit (exhaust fan)

- 3.4.5. Rectify electrical/ electronic problem components
 - Repair
 - Replace
 - Install/Assemble
- 3.5 Perform machine functionality test
 - 3.5.1. Comply to machine tools safety features according to testing Standard Operation Procedure (SOP)
 - 3.5.2. Perform test run method and procedures of the machine tools under condition without load and with load using
 - visual
 - vibration
 - noise
 - heat
 - Etc.
 - 3.5.3. Confirm functionality of machine tools
 - Checklist
 - Commissioning and endorsement
 - Etc.
 - 3.5.4. Check electrical/electronic system functionality using testing equipment
 - Voltage
 - Current stability
 - Current leakage
 - Insulation
 - Continuity
 - Etc
 - 3.5.5. Carry out housekeeping activities
 - Cleaning
 - Storage
 - Sorting
 - Etc.
- 3.6 Produce machine tool maintenance report (electrical/electronic) according to work and test data checklist
 - 3.6.1. Collect maintenance technical data
 - 3.6.2. Interpret maintenance technical data
 - 3.6.3. Confirm maintenance technical data comply to technical drawing and job order
 - 3.6.4. Produce maintenance technical report
 - Manual
 - Computerize

3.7 Comply with attitude, safety and environment listed below when performing this activity.

ATTITUDE	SAFETY	ENVIRONMENTAL
i. Meticulous in selecting machine tool	i. Adhere to safety requirement	i. Comply to environment act
ii. Responsible	ii. Use Personal Protective Equipment	
iii. Cleanliness at workplace		
iv. Cleanliness at work area		
v. 5S compliance		

3.8 Apply core activities listed below when performing this activity.

Social Skills	Core Abilities
Communication skills	L1-CA01-01 Apply working language appropriately (English/ national language etc). L1-CA01-02 Apply oral communication and speak reasonably. L1-CA01-03 Understand reading material. L2-CA01-01 Apply two-way communication L2-CA01-02 Disseminate information electronically L2-CA01-03 Disseminate information manually L3-CA01-01 Demonstrate communication practice
Problem solving skills	L1-CA02-01 Demonstrate honesty and integrity L1-CA02-02 Adopt work punctuality L1-CA02-03 Demonstrate team cooperation L2-CA02-01 Demonstrate responsibility at workplace L2-CA02-02 Apply teamwork cooperation concept L2-CA02-03 Initiate problem solving at workplace L2-CA02-04 Demonstrate work performance awareness
Leadership skill	L3-CA02-01 Demonstrate counselling ability L3-CA02-02 Demonstrate responsibility & authority L3-CA02-03 Demonstrate teamwork ability L3-CA02-04 Demonstrate emotional intelligence L3-CA02-05 Apply work knowledge in identifying clients needs L3-CA02-06 Monitor work performance delivery L2-CA01-04 Apply information confidentiality L3-CA01-02 Apply basic negotiation skills L3-CA06-03 Implement workforce practices L3-CA03-01 Apply cultural requirement at workplace L3-CA03-02 Handle situations that require attention
Teamwork	L1-CA03-01 Respond to instructions L1-CA03-02 Demonstrate discipline at workplace L2-CA03-01 Apply practice work culture L2-CA03-02 Respond appropriately to unusual situations L2-CA03-03 Demonstrate initiative and flexibility L2-CA04-01 Demonstrate health compliance L2-CA04-02 Demonstrate safety compliance L2-CA04-03 Demonstrate environment compliance L3-CA04-01 Execute health consciousness L3-CA04-02 Execute safety consciousness L3-CA04-03 Execute environment compliance
Multitasking and prioritizing	L1-CA04-01 Adhere to health awareness activity L1-CA04-02 Adhere to safety awareness activity L1-CA04-03 Adhere to environmental awareness activity L3-CA05-01 Demonstrate Technology update awareness L3-CA05-02 Demonstrate Information technology regulatory Awareness L3-CA06-01 Demonstrate work asset usage awareness L3-CA06-02 Negotiate acceptance and delivery of products and/or services

E. EVALUATING

You are required to evaluate machine tool maintenance (electrical/electronic) activities using the checklist below.

A	ASSESSMENT CRITERIA (60%)	MARKS GIVEN BY APPRENTICE					MARKS GIVEN BY COACH				
		0	1-2	3-4	5-6	7	0	1-2	3-4	5-6	7
1	Machine tool maintenance (Electrical / Electronic) manual interpreted										
2	Job order interpreted										
3	Machine tool (Electrical / Electronic) to be maintained selected										
4	Types of maintenance selected										
5	Electrical/Electronic Drawing Interpreted										
6	Types of Tools for maintenance (Electrical/ Electronic) Selected										
7	Machine tool (Electrical/ Electronic) dismantle repair and replace performed										
8	Test run method and procedures the machine tools performed										
9	Troubleshooting machine tool (Electrical / Electronic) activity performed										
10	Machine tool maintenance (Electrical / Electronic) data recorded										
	SUBTOTAL	A₁					A₂				
	FULL MARKS	70					70				

B	ATTITUDE/SAFETY/ ENVIRONMENT (20%)	MARKS GIVEN BY APPRENTICE					MARKS GIVEN BY COACH				
		0	1-2	3-4	5-6	7	0	1-2	3-4	5-6	7
1	Attitude										
2.	Safety										
3	Environmental										
		B₁					B₂				
		21					21				
C	EMPLOYABILITY SKILLS (SOCIAL SKILLS) (20%)	MARKS GIVEN BY APPRENTICE					MARKS GIVEN BY COACH				
		0	1-2	3-4	5-6	7	0	1-2	3-4	5-6	7
1	Communication skills										
2	Problem solving skills										
3	Leadership skill										
4	Teamwork										
5	Multitasking and prioritizing										
		C₁					C₂				
	FULL MARKS	35					35				

CALCULATION TABLE

	MARKS GIVEN BY APPRENTICE	MARKS GIVEN BY COACH	WEIGHTED MARKS GIVEN BY APPRENTICE	WEIGHTED MARKS GIVEN BY COACH
ASSESSMENT CRITERIA	A_1	A_2	$A_1 / 70 \times 60$	$A_2 / 70 \times 60$
ATTITUDE, SAFETY & ENVIRONMENT	B_1	B_2	$B_1 / 21 \times 20$	$B_2 / 21 \times 20$
EMPLOYABILITY SKILLS (SOCIAL SKILLS)	C_1	C_2	$C_1 / 35 \times 20$	$C_2 / 35 \times 20$
Total			X	Y
Ratio of Percentage (Apprentice: Coach)			P%	Q%
Grand Total			$(P/100 \times X) + (Q/100 \times Y)$	

COMMENTS/ RECOMMENDATIONS BY COACH

COACH:
DATE:

APPRENTICE:
DATE: