



## LEARN AND WORK ASSIGNMENT (LWA)



<b>NOSS (CODE NOSS)</b>	<b>INDUSTRIAL MAINTENANCE OPERATION (MC-010-3:2012)</b>		
<b>Competency Unit Title (CU CODE)</b>	<b>AUTOMATION SYSTEM MAINTENANCE MC-010-3:2012-C04</b>	<b>LEVEL</b>	<b>3</b>
<b>Competency Unit Descriptor</b>	<p>Automation system maintenance is the heart of identifying the condition of operation system maintenance / monitoring needs of the machine tools.</p> <p>The person who is competent in this CU shall be able to select automation operation system tool to be maintained, select maintenance requirement, select automation maintenance system requirement, perform automation system maintenance, perform automation system functionality test and produce automation maintenance report.</p> <p>The outcome of this competency is to provide excellence automation operation system maintenance according to machine manual as per company's policy, rules and regulation.</p>		
<b>Candidate Name</b>			
<b>Candidate I/C Number</b>			
<b>Company's Name</b>			

**CU WORK ACTIVITY STATEMENT:**  
**PERFORM AUTOMATION SYSTEM MAINTENANCE ACTIVITIES**

**DURATION: 292 HOURS**

**A. SETTING GOAL**

You are required to perform automation system maintenance activities based on performance criteria below:

- 1.1 Determine type of automation operation system to be maintained
  - 1.1.1 Pneumatic
  - 1.1.2 Hydraulic
  - 1.1.3 PLC
  - 1.1.4 PIC
- 1.2 Interpret maintenance schedule
- 1.3 Interpret job order in accordance to the company's policy,
- 1.4 Interpret maintenance rules and regulation.
- 1.5 Determine type of maintenance
  - 1.5.1 Preventive
  - 1.5.2 Corrective
  - 1.5.3 Predictive
- 1.6 Confirm maintenance requirement.
- 1.7 Interpret technical drawing
- 1.8 Interpret technical manual (Automation System Maintenance)
- 1.9 Identify maintenance activity of automation system in accordance to job order and standard operation procedure (SOP)
  - 1.9.1 Pneumatic Parts
    - Cylinder
    - Solenoid valve
    - Actuator
    - Air filter regulator
    - Input/Output
    - Etc

#### 1.9.2 Hydraulic parts

- Cylinder
- Pump (motor, etc.)
- Filter
- Hoses/piping/fitting
- Oil level/viscosity
- Valve
- Input/output
- Etc

#### 1.9.3 PLC parts

- Power supply
- Air ventilation
- Download/upload program
- Basic programming and propose modification.
- Input / output
- Etc

#### 1.10 Identify automation system problem

##### 1.10.1 Leakage

##### 1.10.2 Unstable

##### 1.10.3 Vibration

##### 1.10.4 Wear and Tear

##### 1.10.5 Etc

#### 1.11 Identify functionality of automation system

##### 1.11.1 Safety of machine

##### 1.11.2 Safety interlock of equipment

##### 1.11.3 Free running test run

##### 1.11.4 Actual machine test

#### 1.12 Identify checklist requirement

#### 1.13 Identify automation system report format.

#### 1.14 Identify submission documentations to person in charge.

## **B. PLANNING**

You are required to plan activities in performing automation system maintenance to achieve setting goal by using resources listed below:

2.1 Identify tools, equipment & materials.

ITEMS	RATIO (TEM : Trainees)
1. Testing instruments	1:5
2. Testing instrument storage (Cabinet)	1:5
3. Machine electrical / electronic schematic wiring diagram	1:5
4. Hydraulic training kit	1:5
5. Pneumatic training kit	1:5
6. Plc training kit	1:5
7. Pic training kit	1:5
8. Check sheet	1:1
9. Tool box	1:1
10. Hand tool set	1:1
11. Power tools	1:5
12. Personal protective equipment (PPE)	1:1
13. Workpiece / sample for testing	1:1
14. Management information system (MIS)	1:5

2.2 Perform automation system maintenance workflow.

2.3 Identify automation system maintenance procedures, flow chart and correct sequence.

2.4 Plan duration/time of automation system maintenance procedures.

2.5 Identify manpower in performing automation system maintenance activities.

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

#### REFERENCES

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## **C. DECISION MAKING**

You are required to get coach approval before performing automation system maintenance activities.

## **D. EXECUTING & MONITORING**

You are required to perform automation system maintenance activities according to the steps below:

- 3.1 Adhere to Safety procedures and Standard Operation Procedures.
- 3.2 Select automation system to be maintained
  - 3.2.1 Interpret automation system maintenance schedule
  - 3.2.2 Identify types and functions of automation system
  - 3.2.3 Interpret Job order instructions/ Maintenance checklist
  - 3.2.4 Comply to company's policy, safety rules and regulation
- 3.3 Select maintenance requirement
  - 3.3.1 Preventive
  - 3.3.2 Corrective
  - 3.3.3 Predictive
- 3.4 Select automation maintenance system requirement
  - 3.3.1 Determine automation drawing and specifications
    - Pneumatic/Electro pneumatic diagram
    - Hydraulic/Electro hydraulic diagram
    - PLC/PIC diagram
    - Etc.
  - 3.3.2 Interpret automation drawing and specifications
    - Single line drawing
    - Symbol
    - Schematic drawing/diagram
    - Etc.
  - 3.3.3 Choose automation maintenance tools
    - Computer/console
    - Hand tools
    - Power tools
    - Viscosity meter
    - Multimeter
    - Etc.
  - 3.3.4 Check functionality of automation maintenance tools
    - Cleanliness
    - Connectivity
    - Accuracy
    - Reliability
    - Compatibility
    - Etc.

- 3.5 Perform Automation system maintenance
  - 3.4.1 Carry out Pneumatic parts (check, repair or replace) such as;
    - Cylinder
    - Solenoid valve
    - Actuator
    - Air filter regulator
  - 3.4.2 Carry out Hydraulic parts (check, repair or replace) such as;
    - Cylinder
    - Pump motor
    - Filter
    - Hoses/piping/ fitting
    - Oil level/viscosity
    - Valve
  - 3.4.3 Replace PLC/PIC parts (check, repair, clean or replace) such as;
    - Power supply
    - Input / Output Module
    - Sensoric / Actoric
    - Wiring
- 3.6 Perform automation system functionality test
  - 3.5.1 Carry out automation system problem troubleshoot
    - PLC/PIC
    - Pneumatic
    - Hydraulic
  - 3.5.2 Safety procedures adhered in accordance to testing standard operation procedures.
  - 3.5.3 Check safety of machine and safety interlock of equipment
    - Occupation Safety and Health Act (OSHA)
    - Manual Operation
    - Installation procedure
    - Etc.
  - 3.5.4 Check Functionality of the automation system
    - Leakage
    - Stability
    - Smooth
    - Noise
    - Accuracy
    - Etc.
  - 3.5.5 Carry out dynamic test
    - Without load
    - With load
    - Troubleshooting
    - Etc.
  - 3.5.6 Confirm functionality of the automation system
    - Checklist
    - Commissioning and endorsement
    - Etc.

### 3.7 Produce automation maintenance report according to work and test data checklist

3.7.1 Collect maintenance technical Data

3.7.2 Interpret maintenance technical Data

3.7.3 Confirm maintenance technical Data comply to technical drawing and job order

3.7.4 Produce maintenance technical report

- Manual
- Computerize

3.8 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. Accurate in writing report		
v. 5S compliance		



3.9 Apply core activities listed below when performing this activity.

Social Skills	Core Abilities
Communication skills	<p>L1-CA01-01 Apply working language appropriately (English/ national language etc).</p> <p>L1-CA01-02 Apply oral communication and speak reasonably.</p> <p>L1-CA01-03 Understand reading material.</p> <p>L2-CA01-01 Apply two-way communication</p> <p>L2-CA01-02 Disseminate information electronically</p> <p>L2-CA01-03 Disseminate information manually</p> <p>L3-CA01-01 Demonstrate communication practice</p>
Problem solving skills	<p>L1-CA02-01 Demonstrate honesty and integrity</p> <p>L1-CA02-02 Adopt work punctuality</p> <p>L1-CA02-03 Demonstrate team cooperation</p> <p>L2-CA02-01 Demonstrate responsibility at workplace</p> <p>L2-CA02-02 Apply teamwork cooperation concept</p> <p>L2-CA02-03 Initiate problem solving at workplace</p> <p>L2-CA02-04 Demonstrate work performance awareness</p>
Leadership skill	<p>L3-CA02-01 Demonstrate counselling ability</p> <p>L3-CA02-02 Demonstrate responsibility &amp; authority</p> <p>L3-CA02-03 Demonstrate teamwork ability</p> <p>L3-CA02-04 Demonstrate emotional intelligence</p> <p>L3-CA02-05 Apply work knowledge in identifying clients needs</p> <p>L3-CA02-06 Monitor work performance delivery</p> <p>L2-CA01-04 Apply information confidentiality</p> <p>L3-CA01-02 Apply basic negotiation skills</p> <p>L3-CA06-03 Implement workforce practices</p> <p>L3-CA03-01 Apply cultural requirement at workplace</p> <p>L3-CA03-02 Handle situations that require attention</p>
Teamwork	<p>L1-CA03-01 Respond to instructions</p> <p>L1-CA03-02 Demonstrate discipline at workplace</p> <p>L2-CA03-01 Apply practice work culture</p> <p>L2-CA03-02 Respond appropriately to unusual situations</p>

	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 automation system maintenance 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	Types of automation system to be maintain selected										
2	Job order instructions/ maintenance checklist interpreted										
3	Automation drawing and specifications interpreted										
4	Types of maintenance determined										
5	Automation maintenance tools selected										
6	Automation parts repaired or replaced										
7	Automation system problem troubleshoot carried out										
8	Functionality test of the automation system carried out										
9	Automation maintenance data recorded										
	<b>SUBTOTAL</b>	<b>A<sub>1</sub></b>					<b>A<sub>2</sub></b>				
	<b>FULL MARKS</b>	<b>63</b>					<b>63</b>				

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

## CALCULATION TABLE

	MARKS GIVEN BY APPRENTICE	MARKS GIVEN BY COACH	WEIGHTED MARKS GIVEN BY APPRENTICE	WEIGHTED MARKS GIVEN BY COACH
ASSESSMENT CRITERIA	$A_1$	$A_2$	$A_1 / 63 \times 60$	$A_2 / 63 \times 60$
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: