



Model Curriculum

NOS Name: Fundamentals of Low Cost Automation in Manufacturing Process

NOS Code: ASC/N6464

NOS Version: 1.0

NSQF Level: 5.5

Model Curriculum Version: 1.0

Automotive Skills Development Council | E 113, Okhla Industrial Area, Phase – III,
New Delhi – 110020

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Training Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
Country	India
NSQF Level	5.5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.0801
Minimum Educational Qualification and Experience	UG Diploma in relevant field with 1.5 Years of Relevant experience OR 3 rd year of UG Degree in relevant field OR Diploma after 10th in relevant field with 3 Years of Relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years

Next Review Date	15/03/2027
NSQC Approval Date	15/03/2024
QP Version	1.0
Model Curriculum Creation Date	15/03/2024
Model Curriculum Valid Up to Date	15/03/2027
Model Curriculum Version	1.0
Minimum Duration of the Course	60 Hours
Maximum Duration of the Course	60 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes:

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Principles of low-cost automation, including the use of low-cost sensors, actuators, and controllers, as well as the importance of modularity and standardization.
- Methods to design low-cost automation elements using CAD software, as well as how to select appropriate materials and components based on cost and performance requirements.
- Integrate low-cost automation elements into the automotive manufacturing process, including how to connect them to existing systems and how to ensure compatibility with other automation elements.
- Test & validate low-cost automation elements for functionality, reliability, and safety, as well as how to troubleshoot any issues that arise during testing.
- Optimize the cost of low-cost automation elements by selecting appropriate components, minimizing waste, and maximizing efficiency.

Sub-NOS Details	Theory Duration	Practical Duration	On-the-Job Training Duration	Total Duration
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ASC/N6464- Fundamentals of Low Cost Automation in Manufacturing Process NSQF Level- 5.5	15:00	45:00	00:00	60:00
Module: 1- Introduction Fundamentals of Low Cost Automation in Manufacturing Process , Mapped to ASC/N6464	05:00			05:00
Module: 2- Fundamentals of Low Cost Automation in Manufacturing Process , Mapped to ASC/N6464	10:00	45:00		55:00
Total Duration	15:00	45:00	00:00	60:00

Module Details

Bridge Module-1 Introduction to Fundamentals of Low Cost Automation in Manufacturing Process,

Mapped to ASC/N6464

Terminal Outcomes:

- Interpret the principles of low-cost automation, including the use of low-cost sensors, actuators, and controllers, as well as the importance of modularity and standardization.
- Investigate about various applications of low-cost automation in the automotive manufacturing process, such as assembly line robots, material handling systems, and quality control machines.

Duration: <5:00>	Duration: <0:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Concept of low-cost automation and its importance in modern manufacturing and production processes. • Different types of low-cost automation technologies, such as pneumatic, electric, and hydraulic systems. • Benefits and limitations of low-cost automation, such as reduced costs, improved efficiency, and lower maintenance requirements. 	
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Case Study Documents on Low-Cost Automation, Industrial Sensors, Robots, PLC Controllers, Motor Conveyors.	

Module: 2 Fundamentals of Low Cost Automation in Manufacturing Process, Mapped to ASC/N6464

Terminal Outcomes:

- Participants will develop skills in designing and integrating low-cost automation elements into automotive manufacturing processes.
- Participants will acquire programming skills for the control and operation of automated systems, emphasizing cost-effective programming approaches.

Duration: <10:00>	Duration: <45:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Design principles of low-cost automation systems, including modularity, flexibility, and scalability. • Techniques for analyzing the cost-effectiveness of automation solutions, including initial investment, operating costs, and long-term benefits. • Interdisciplinary nature of integrating automation elements, including the integration of mechanical, electrical, and software components. • Fundamental principles and theories underlying automation, including the concept of feedback control, sensors, actuators, and system dynamics. • Types of sensors and actuators used in automotive manufacturing and understand their principles of operation and applications in automation. 	<p>Hands-On Design Projects:</p> <p>Successfully design low-cost automation elements for specific tasks in automotive manufacturing through hands-on projects, considering factors like task complexity, efficiency, and cost-effectiveness.</p> <p>Simulation and Modeling:</p> <p>Use simulation tools to model and simulate the behavior of automated systems, allowing participants to test and validate their designs before actual implementation.</p> <p>Prototyping:</p> <p>Develop prototypes of automated systems, integrating components such as sensors, actuators, and controllers to demonstrate the practical feasibility of the designed solutions.</p> <p>Team Projects:</p> <p>Work collaboratively in teams to design, implement, and optimize automation solutions, fostering effective communication and teamwork skills.</p> <p>Stakeholder Engagement:</p>

	Engage with stakeholders, including production teams, engineers, and management, to understand their requirements and incorporate practical feedback into the automation design process.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<ul style="list-style-type: none">Industrial Sensors, Controllers, Design Software, Simulation Software, Actuators, E-Plan.	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
B.E/B.Tech	Mechanical/Automobile /Mechatronics/Electronics/ Electrical/Manufacturing	3	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	1	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	NA
B.E/B.Tech	Mechanical/Automobile /Mechatronics/Electronics/ Electrical/Manufacturing	4	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	0	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	NA
Diploma	Mechanical/Automobile /Mechatronics/Electronics/ Electrical/Manufacturing	5	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	1	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	NA
Diploma	Mechanical/Automobile /Mechatronics/Electronics/ Electrical/Manufacturing	6	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	0	Mechanical/Automobile /Mechatronics/Electronics/Electrical/Manufacturing	NA

Trainer Certification	
Domain Certification	Platform Certification
“ Fundamentals of Low Cost Automation in Manufacturing Process”, ASC/N6464, minimum accepted score is 80%	“Recommended that the trainer is certified for the job role “Trainer (VET and Skills)”, Mapped to Qualification Pack: MEP/Q2601, V2.0” Minimum accepted score is 80%.”

Assessor Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
B.E/B.Tech	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	3	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	1	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	NA
B.E/B.Tech	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	4	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	0	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	NA
Diploma	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	5	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	1	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	NA
Diploma	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	6	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	0	Mechanical/Automobile/Mechatronics/Electronics/Electrical/Manufacturing	NA

Assessor Certification	
Domain Certification	Platform Certification
“ Fundamentals of Low Cost Automation in Manufacturing Process”, ASC/N6464, minimum accepted score is 80%	Recommended that the Assessor is certified for the job role “Assessor (VET and Skills)”, Mapped to Qualification Pack: MEP/Q2701, V2.0” Minimum accepted score is 80%.

Assessment Strategy

1. Assessment System Overview:
 - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
 - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
 - Assessment agency deploys the ToA certified Assessor for executing the assessment
 - SSC monitors the assessment process & records
2. Testing Environment:
 - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
 - Check the duration of the training.
 - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
 - If the batch size is more than 30, then there should be 2 Assessors.
 - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
 - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
 - Confirm the number of TABs on the ground is correct to execute the Assessment smoothly.
 - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
 - Question papers created by the Subject Matter Experts (SME)
 - Question papers created by the SME verified by the other subject Matter Experts
 - Questions are mapped with Semester-wise Curriculum.
 - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
 - Assessor must be ToA certified & trainer must be ToT Certified
 - Assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
 - Time-stamped & geotagged reporting of the assessor from assessment location
 - Centre photographs with signboards and scheme specific branding
 - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
 - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:
 - Surprise visit to the assessment location
 - Random audit of the batch
 - Random audit of any candidate
6. Method for assessment documentation, archiving, and access
 - Hard copies of the documents are stored
 - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
 - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
PLC	Programmable Logic Controller
HMI	Human Machine Interface