



Model Curriculum

QP Name: Automotive CAD Technician

QP Code: ASC/Q8201

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 1.0

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Training Parameters

Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Designing
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3118.0301
Minimum Educational Qualification and Experience	Diploma (Mechanical/Automobile) from recognized regulatory body OR I.T.I (Fitter/Draughtsman (Mechanical)) with 1 years of relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	30/09/2021
Next Review Date	30/09/2024
NSQC Approval Date	30/09/2021
QP Version	2.0
Model Curriculum Creation Date	30/09/2021
Model Curriculum Valid Up to Date	30/09/2024
Model Curriculum Version	1.0
Minimum Duration of the Course	400 Hours 00 Minutes
Maximum Duration of the Course	400 Hours 00 Minutes

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.

- Identify product specifications and requirements for CAD designing.
- Perform steps to finalise product specifications and conduct reliability check of product design in co-ordination with line manager.
- Carry out designing of product on CAD software.
- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Use resources optimally to ensure less wastage and maximum conservation.
- Communicate effectively and develop interpersonal skills.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module					
Module 1: Introduction to the role of an Automotive CAD Technician	8:00	0:00			8:00
ASC/N9803 – Organize work and resources (Manufacturing) NOS Version No. – 1.0 NSQF Level – 3	16:00	24:00			40:00
Module 2: Organize work and resources according to safety and conservation standards	16:00	24:00			40:00
ASC/N9802 – Interact effectively with colleagues, customers and others NOS Version No. – 1.0 NSQF Level - 3	12:00	20:00			32:00
Module 3: Communicate effectively and efficiently	12:00	20:00			32:00
ASC/N8201 – Create design of component/ aggregate NOS Version No. – 2.0 NSQF Level - 4	120:00	200:00			320:00
Module 4: Prepare for product designing	48:00	72:00			120:00
Module 5: Perform product designing	72:00	128:00			200:00

Total Duration	156:00	244:00			400:00
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Module Details

Module 1: Introduction to the role of an Automotive CAD Technician

Bridge module

Terminal Outcomes:

- Discuss the role and responsibilities of an Automotive CAD Technician.

Duration: <08:00>	Duration: <00:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List the role and responsibilities of an Automotive CAD Technician. • Discuss the job opportunities for an Automotive CAD Technician in the automobile industry. • Explain about Indian automobile manufacturing market. • List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them. • Discuss the CAD designing standards and procedures involved in industry. 	
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	

Module 2: Organize work and resources according to safety and conservation standards

Mapped to ASC/N9803, v1.0

Terminal Outcomes:

- Employ appropriate ways to maintain safe and secure working environment.
- Perform work as per the quality standards.
- Apply conservation practices at the workplace.

Duration: <16:00>	Duration: <24:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List the potential workplace related risks and hazards, their causes and preventions. • Identify PPE to be used at workplace. • Identify various warning signs used at the workplace. • Describe appropriate strategies to deal with emergencies and accidents at the workplace. • Outline the organizational structure to be followed to report about health, safety and security breaches to the concerned authorities. • Discuss the importance of keeping work area clean and tidy. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. • Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any to the concerned authorities. • Discuss the ways of dealing with stress and anxiety. • Discuss how to complete the given work within the stipulated time period. • Explain how to maintain a proper balance between team and individual goals. • Explain 5S guidelines at workplace. • List the various materials used at the workplace. • Explain organisational recommended procedure for storage of tools, equipment and material after completion of work. • Explain the ways to optimize usage of resources. • Discuss various methods of waste management and its disposal. 	<ul style="list-style-type: none"> • Apply appropriate safety practices to ensure safety of people at the workplace • Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate the use of fire extinguisher. • Apply basic first aid procedure in case of emergencies. • Perform routine cleaning of tools, equipment and machines. • Employ various techniques for checking malfunctions in the equipment as per Standard Operating Procedure (SOP). • Show how to sanitize and disinfect one's work area regularly. • Demonstrate the correct way of washing hands using soap and water. • Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs. • Demonstrate how to evacuate the workplace in case of an emergency. • Demonstrate sorting of materials, tools and equipment and spare parts after completion of work. • Demonstrate the steps involved in storage of tools, equipment and material after completion of work. • Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. • Demonstrate different disposal techniques depending upon types of waste. • Employ different ways to check if equipment/machines are functioning as per requirements and report malfunctioning, if observed. • Employ ways for efficient utilization of

<ul style="list-style-type: none"> • List the different categories of waste for the purpose of segregation • Differentiate between recyclable and non-recyclable waste • State the importance of using appropriate colour dustbins for different types of waste. • Discuss common practices for conserving electricity at workplace. • Discuss the common sources of pollution and ways to minimize it. 	<p>material and water.</p>
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<ul style="list-style-type: none"> • Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher • Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit 	

Module 3: Communicate Effectively and Efficiently

Mapped to ASC/N9802, v1.0

Terminal Outcomes:

- Use effective communication and interpersonal skills.
- Apply sensitivity while interacting with different genders and people with disabilities.

Duration: <12:00>	Duration: <20:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the organizational structure for communicating with colleagues, seniors and others. • Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD). • Explain the importance of respecting personal space of colleagues. • State the procedure to receive work instructions and report problems to the supervisor. • List the various organizational policies and procedures to be followed at the workplace. • Describe different ways to rectify commonly occurring errors. • Explain the importance of complying with the instructions/guidelines and procedures while performing tasks related to the job specifications. • Discuss the importance of PwD and gender sensitization. 	<ul style="list-style-type: none"> • Employ different means of communication depending upon the requirement while interacting with others. • Demonstrate using new ways to maintain good relationships with colleagues and supervisor. • Prepare a sample report to send the work status to the supervisor. • Demonstrate how to communicate with different genders and persons with disability (PwD) in a sensitive manner.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Sample of escalation matrix, organisation structure.	

Module 4: Prepare for product designing

Mapped to ASC/N8201, v2.0

Terminal Outcomes:

- Identify requirements and specifications for the layout designing process.
- Demonstrate how to support manager in finalising the specifications of layout design.
- Apply appropriate techniques to check the reliability and validity of layout design.

Duration: <48:00>	Duration: <72:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Discuss how to read and interpret basic electrical drawings, controller logic, symbols and wiring layout. • List different components/aggregates of electric vehicle. • Discuss basic technology used, functioning and interconnections of various systems and components of the vehicle. • Recall fundamental terms, laws and principles of electricity used in EV. • Discuss the information needed to collect from the Cross Functional Team (CFT) about the product requirements. • Recall procedure that displays design hierarchy. • Discuss various design specifications and parameters such as road scenarios, vehicle aesthetic appeal & ergonomics, shape/size/ environmental impact etc. and their impact on design of product. • Elaborate ways to analyse the type of component, technology, technique and design parameters for the design of product. • List various simulation tools such as CAD, CAM etc. required during the product designing process. • Describe the selection criteria of simulation tools required during the product designing process. • Describe the process flow of designing the vehicle and its components. • Elaborate ways to identify reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc. to finalise the product design. • Explain procedure of testing and validation of the simulation. • List ways for to checking the reliability and 	<ul style="list-style-type: none"> • Apply appropriate ways to identify and select the simulation tools required during the product designing process. • Demonstrate the use of simulation tools. • Role play a situation to support the line manager in creating specifications and deciding means for providing design input and requirements of product. • Perform steps to create a mechanism for capturing design output and ensure all the required design specifications are achieved and output is in conformance with the input. • Role play a situation on how to take support from production design manager in prioritizing key reliability risk items and the corresponding risk reduction strategy. • Show how to estimate and analyse the products design reliability by using simulation models. • Show how to analyse failure risks and mechanics of the product design. • Demonstrate use of Life Data Analysis (LDA) techniques to estimate the product design reliability and calculate various reliability-related metrics. • Perform steps to conduct Reliability Growth (RG) testing and analyse effective methodology to identify defects in product design. • Apply appropriate ways to improve the design during/ post testing inputs.

<p>validity of the product design.</p> <ul style="list-style-type: none"> • Describe design of experiments methodology and how use it to identify factors significant to the life of the vehicle. • Describe Life Data Analysis (LDA) techniques and their use. • List the steps to be performed for conducting Reliability Growth (RG) testing of product design. • Discuss the records needed to be maintained for vehicle product designing and reliability study as per SOP. 	
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<ul style="list-style-type: none"> • Basic tool box, Work bench with vice, DC – DC Convertor, DC Fast charger , High voltage battery, onboard charger & EVSE , In vehicle power electronics, Riveting machine, drilling machine, riveting guns, pneumatic guns, fasteners, rubber seals, soldering iron, jigs, fixtures, adhesives, vernier calliper, micrometre, compass, divider, scriber, T Square, bevel protractor, pin set, torque meter • Hand book, job orders, work order, completion material requests, and Technical Reference Books. • Safety materials: Fire extinguisher, welding helmet, Leather sleeves, leather safety gloves, leather aprons, safety glasses with side shields, ear plug, safety shoes and first-aid kit • Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel 	

Module 5: Perform product designing and validation

Mapped to ASC/N8201, v2.0

Terminal Outcomes:

- Identify simulation tools, software and applications required for product designing work.
- Perform the steps to carry out simulations on the product design.
- Demonstrate use of telematics system and HMI (Human Machine Interface) to achieve specific performance and goal objectives.

Duration: <72:00>	Duration: <128:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List various simulation tools, software and applications required during designing work. • Discuss the parameters and factors need to analyse, check and validate the EV design. • Discuss how to integrate and calibrate the vehicle. • Discuss the design of BMS and EMC criteria. • Discuss the process of conducting failure analysis and impact of each cause of failure on vehicle. • Discuss possible failure scenarios can occur in a simulation model. • List the steps to be performed for creating failure modes in simulation model. • Discuss how to identify seriousness of each cause by making a rating system. • Discuss process controls which are applicable and which can be established for a failure cause. • Describe detection rating (DR) for a failure cause. • List the steps to be performed for testing and validation of the simulation model. • Elucidate high performance HMI (Human Machine Interface) philosophy, style and use in EV model designing. • Describe functioning of telematics system. • Elaborate ways to analyse controls needed to be monitored and manipulated to achieve the desired requirements. • Discuss parameters used for evaluating the performance of the design. • Discuss information, records and data needed to be collected, maintained and stored related to product designing and 	<ul style="list-style-type: none"> • Show how to transform the functional architecture of vehicle design to physical architecture. • Demonstrate organisational specified procedure of creating EV product designs as per the defined geometrical parameters. • Show how to build a simulated model of the EV design as per the work instructions. • Apply appropriate ways to analyse, check and validate the EV design structural strength, components tolerance limits, model strength on different loads etc. • Demonstrate the organizational specified procedure to integrate the smaller circuits, different sensors and actuators in the design. • Show how to validate and simulate the battery points in design by using BMS software. • Demonstrate how to support line manager in preparing and validating the standardized Work Analysis Sheet for basic processes used in the simulation. • Perform steps to create failure modes in simulation model to identify all possible failure scenarios, root causes and consequence of each failure mode. • Prepare a sample rating system to identify the seriousness of each cause as per organisational standards. • Apply appropriate ways to implement recommended actions to lower the severity or occurrence of each cause. • Apply appropriate ways to formulate the simulation model and check the architectural design in co-ordination with line manager.

<p>validation as per SOP.</p> <ul style="list-style-type: none"> • Discuss how to plan and control the entire system through status control reports, meetings reviews, etc. • Discuss the importance of continuous system integration and validation of the related data. 	<ul style="list-style-type: none"> • Perform steps to run the simulation, test the model, analyse results of test by comparing behaviour with the actual environment and making changes accordingly in the model. • Apply appropriate ways to validate the simulation model by checking the feasibility of vehicle and its components in real time world. • Prepare as sample work combination sheet having the details of processes used, work sequence order and changes done after failure analysis in the simulation. • Show how to validate that telematics system is functioning as per the requirement. • Demonstrate use of high performance HMI (Human Machine Interface) to achieve required standards and performance in EV model designing. • Demonstrate organisational specified procedure of creating high performance graphics by following the HMI and addressing the identified tasks. • Demonstrate organisational procedure of installation, commissioning and training on the new HMI. • Employ practices to control, maintain and periodically re-assess the HMI performance of vehicle. • Apply appropriate ways to collect, maintain and store information, records and data related to product design, product structure management, product material, process management of the product, product development and tools to be used, history, present use, serialization, part status, customer preference etc. as per SOP.
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<ul style="list-style-type: none"> • Basic tool box, Work bench with vice, DC – DC Converter, DC Fast charger , High voltage battery, onboard charger & EVSE , In vehicle power electronics, Riveting machine, drilling machine, riveting guns, pneumatic guns, fasteners, rubber seals, soldering iron, jigs, fixtures, adhesives, vernier calliper, micrometre, compass, divider, scribe, T Square, bevel protractor, pin set, torque meter • Hand book, job orders, work order, completion material requests, and Technical Reference Books. • Safety materials: Fire extinguisher, welding helmet, Leather sleeves, leather safety gloves, leather aprons, safety glasses with side shields, ear plug, safety shoes and first-aid kit 	

- Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel

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	4	Mechanical/Automobile	1	Mechanical/Automobile	NA
B.E/B.Tech	Mechanical/Automobile	5	Designing	0	Assessment	NA
Diploma	Mechanical/Automobile	5	Designing	1	Assessment	NA
Diploma	Mechanical/Automobile	6	Designing	0	Assessment	NA

Trainer Certification	
Domain Certification	Platform Certification
“Automotive CAD Technician, ASC/Q8201, version 2.0”. Minimum accepted score is 80%.	“Trainer, MEP/Q2601 v1.0” Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
B.E./B.Tech	Mechanical/Automobile	5	Mechanical/Automobile	1	Mechanical/Automobile	NA
B.E./B.Tech	Mechanical/Automobile	6	Designing	0	Assessment	NA
Diploma	Mechanical/Automobile	6	Designing	1	Assessment	NA
Diploma	Mechanical/Automobile	7	Designing	0	Assessment	NA

Assessor Certification	
Domain Certification	Platform Certification
“Automotive CAD Technician, ASC/Q8201, version 2.0”. Minimum accepted score is 80%.	“Assessor; MEP/Q2701 v1.0” 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 are 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 NOS and PC
 - 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 (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the 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
SOP	Standard Operating Procedure
WI	Work Instructions
PPE	Personal Protective equipment