

Qualification Pack



Electric Vehicle Product Design Engineer

QP Code: ASC/Q8104

Version: 2.0

NSQF Level: 4.5

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ASC/Q8104: Electric Vehicle Product Design Engineer

Brief Job Description

The individual at this job is responsible for designing the automotive products using different simulation tools on the basis of requirements. The individual is also responsible for supporting the manager in ensuring that the designed product includes aspects related to telematics, human machine interface, ergonomics and design of EV.

Personal Attributes

The person should be patient, organised, team-oriented and have the ability to work for long hours in adverse conditions. They should be keen observers and have an eye for detail and quality.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [ASC/N9810: Manage work and resources \(Manufacturing\)](#)
2. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)
3. [ASC/N9805: Interpret engineering drawing](#)
4. [ASC/N8106: Support the manager in finalising the design specifications and reliability parameters of the product](#)
5. [ASC/N8107: Design Vehicles and components using simulation tools](#)

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Designing
Country	India
NSQF Level	4.5
Credits	17
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.0803

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Minimum Educational Qualification & Experience	10th grade pass with 3 Years of experience of relevant experience OR Completed 3-year diploma (after 10th) OR Completed 2nd year diploma after 12th OR Pursuing 1st year of UG (of B.E/B.Tech and continuous education)
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	21 Years
Last Reviewed On	NA
Next Review Date	30/09/2024
NSQC Approval Date	30/09/2021
Version	2.0
Reference code on NQR	2021/AUT/ASDC/04527
NQR Version	2

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ASC/N9810: Manage work and resources (Manufacturing)

Description

This NOS unit is about implementing safety, planning work, adopting sustainable practices for optimising the use of resources.

Scope

The scope covers the following :

- Maintain safe and secure working environment
- Maintain Health and Hygiene
- Effective waste management practices
- Material/energy conservation practices

Elements and Performance Criteria

Maintain safe and secure working environment

To be competent, the user/individual on the job must be able to:

- PC1.** identify hazardous activities and the possible causes of risks or accidents in the workplace
- PC2.** implement safe working practices for dealing with hazards to ensure safety of self and others
- PC3.** conduct regular checks of the machines with support of the maintenance team to identify potential hazards
- PC4.** ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions
- PC5.** organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices
- PC6.** fill daily check sheet to report improvements done and risks identified
- PC7.** ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others
- PC8.** report any identified breaches in health, safety and security policies and procedures to the designated person

Maintain Health and Hygiene

To be competent, the user/individual on the job must be able to:

- PC9.** ensure workplace, equipment, restrooms etc. are sanitized regularly
- PC10.** ensure team is aware about hygiene and sanitation regulations and following them on the shop floor
- PC11.** ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace
- PC12.** report advanced hygiene and sanitation issues to appropriate authority
- PC13.** follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc
- PC14.** wear and dispose PPEs regularly and appropriately

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Effective waste management practices

To be competent, the user/individual on the job must be able to:

PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP

PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste

Material/energy conservation practices

To be competent, the user/individual on the job must be able to:

PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively

PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water

PC19. identify possibilities of using renewable energy and environment friendly fuels

PC20. identify processes where material and energy/electricity utilization can be optimized

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. organisation procedures for health, safety and security, individual role and responsibilities in this context

KU2. the organisation's emergency procedures for different emergency situations and the importance of following the same

KU3. evacuation procedures for workers and visitors

KU4. how and when to report hazards as well as the limits of responsibility for dealing with hazards

KU5. potential hazards, risks and threats based on the nature of work

KU6. various types of fire extinguisher

KU7. various types of safety signs and their meaning

KU8. appropriate first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.

KU9. relevant standards, procedures and policies related to 5S followed in the company

KU10. the various materials used and their storage norms

KU11. importance of efficient utilisation of material and water

KU12. basics of electricity and prevalent energy efficient devices

KU13. common practices of conserving electricity

KU14. common sources and ways to minimize pollution

KU15. categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

KU16. waste management techniques

KU17. significance of greening

Generic Skills (GS)

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User/individual on the job needs to know how to:

- GS1.** read safety instructions/guidelines
- GS2.** modify work practices to improve them
- GS3.** work with supervisors/team members to carry out work related tasks
- GS4.** complete tasks efficiently and accurately within stipulated time
- GS5.** inform/report to concerned person in case of any problem
- GS6.** make timely decisions for efficient utilization of resources
- GS7.** write reports such as accident report, in at least English/regional language

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Maintain safe and secure working environment</i>	20	13	-	8
PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace	4	2	-	2
PC2. implement safe working practices for dealing with hazards to ensure safety of self and others	3	1	-	2
PC3. conduct regular checks of the machines with support of the maintenance team to identify potential hazards	2	2	-	1
PC4. ensure that all the tools/equipment/fasteners/spare parts are arranged as per specifications/utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions	3	2	-	1
PC5. organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices	2	-	-	-
PC6. fill daily check sheet to report improvements done and risks identified	2	2	-	-
PC7. ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others	2	2	-	1
PC8. report any identified breaches in health, safety and security policies and procedures to the designated person	2	2	-	1
<i>Maintain Health and Hygiene</i>	13	7	-	5
PC9. ensure workplace, equipment, restrooms etc. are sanitized regularly	3	2	-	1
PC10. ensure team is aware about hygiene and sanitation regulations and following them on the shop floor	2	1	-	-
PC11. ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace	2	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1
PC13. follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc	2	1	-	1
PC14. wear and dispose PPEs regularly and appropriately	3	-	-	1
<i>Effective waste management practices</i>	6	4	-	1
PC15. ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP	3	2	-	-
PC16. ensure proper mechanism is followed while collecting and disposing of non-recyclable, recyclable and reusable waste	3	2	-	1
<i>Material/energy conservation practices</i>	11	6	-	6
PC17. ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively	2	2	-	1
PC18. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water	3	2	-	1
PC19. identify possibilities of using renewable energy and environment friendly fuels	3	1	-	2
PC20. identify processes where material and energy/electricity utilization can be optimized	3	1	-	2
NOS Total	50	30	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9810
NOS Name	Manage work and resources (Manufacturing)
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	2
Version	2.0
Last Reviewed Date	31/08/2021
Next Review Date	31/08/2024
NSQC Clearance Date	31/08/2021

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DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

- PC1.** identify employability skills required for jobs in various industries
- PC2.** identify and explore learning and employability portals

Constitutional values - Citizenship

To be competent, the user/individual on the job must be able to:

- PC3.** recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.
- PC4.** follow environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

- PC5.** recognize the significance of 21st Century Skills for employment
- PC6.** practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

To be competent, the user/individual on the job must be able to:

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- PC7.** use basic English for everyday conversation in different contexts, in person and over the telephone
- PC8.** read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC9.** write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

To be competent, the user/individual on the job must be able to:

- PC10.** understand the difference between job and career
- PC11.** prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

To be competent, the user/individual on the job must be able to:

- PC12.** follow verbal and non-verbal communication etiquette and active listening techniques in various settings
- PC13.** work collaboratively with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

- PC14.** communicate and behave appropriately with all genders and PwD
- PC15.** escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

- PC16.** select financial institutions, products and services as per requirement
- PC17.** carry out offline and online financial transactions, safely and securely
- PC18.** identify common components of salary and compute income, expenses, taxes, investments etc
- PC19.** identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

- PC20.** operate digital devices and carry out basic internet operations securely and safely
- PC21.** use e- mail and social media platforms and virtual collaboration tools to work effectively
- PC22.** use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

To be competent, the user/individual on the job must be able to:

- PC23.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC24.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC25.** identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

To be competent, the user/individual on the job must be able to:

- PC26.** identify different types of customers
- PC27.** identify and respond to customer requests and needs in a professional manner.

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PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and write different types of documents/instructions/correspondence

GS2. communicate effectively using appropriate language in formal and informal settings

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- GS3.** behave politely and appropriately with all
- GS4.** how to work in a virtual mode
- GS5.** perform calculations efficiently
- GS6.** solve problems effectively
- GS7.** pay attention to details
- GS8.** manage time efficiently
- GS9.** maintain hygiene and sanitization to avoid infection

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	1	1	-	-
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values - Citizenship</i>	1	1	-	-
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	2	3	-	-
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development & Goal Setting</i>	1	2	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	2	2	-	-
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
<i>Diversity & Inclusion</i>	1	2	-	-
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	2	3	-	-
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	3	4	-	-
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Entrepreneurship</i>	2	3	-	-
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	1	2	-	-
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship & Jobs</i>	2	3	-	-
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	20	30	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	31/01/2024
Next Review Date	31/01/2027
NSQC Clearance Date	31/01/2024

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ASC/N9805: Interpret engineering drawing

Description

This NOS unit is about reading and interpreting all concepts, symbols, methods, views, etc. of engineering drawing.

Scope

The scope covers the following :

- Interpret information from various views, projection, 2D and 3D shapes
- Identify drawing standards and symbols
- Modification and storage of drawing

Elements and Performance Criteria

Interpret information from various views, projection, 2D and 3D shapes

To be competent, the user/individual on the job must be able to:

- PC1.** interpret engineering drawing's uniqueness, dimensions and important features in 2D and 3D shapes
- PC2.** identify the difference between 2D and 3D shapes
- PC3.** explain difference between first angle projection and third angle projection in mechanical engineering drawing
- PC4.** interpret all the 3 axes (x, y and z axis) and geometrical shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection
- PC5.** identify details of the machine component which are not clearly visible by interpreting section views

Identify drawing standards and symbols

To be competent, the user/individual on the job must be able to:

- PC6.** interpret Geometric Dimensioning and Tolerancing (GD&T) symbols in the drawings
- PC7.** interpret symbols of Radius, controlled radius, spherical radius, diameter, spherical diameter, square, counterbore, spotface, depth, countersink, "by", maximum dimension, minimum dimension, reference, dimension origin etc
- PC8.** identify the sequence of operations which enables the selection and prioritization of the datums
- PC9.** read and interpret information from Tolerance Zone boundaries for part features in terms of shape and size

Modification and storage of drawing

To be competent, the user/individual on the job must be able to:

- PC10.** observe any modification, changes required in the drawing and communicate the same to the concerned team in the organization
- PC11.** store the drawings in an easily accessible place, avoiding damage from moisture, chemicals and fire

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Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** relevant organisational standards such as work standard, Standard Operating Procedure, quality process, maintenance standards etc. followed in the company
- KU2.** importance of cycle-time and required output as per work order and work instructions
- KU3.** drawing standards used by the company
- KU4.** use of drawing tools such as scales, compass, types of pencils, CAD and CAM software etc.
- KU5.** the basics of engineering drawing, orthographic projection, isometric projection, GD&T etc.
- KU6.** importance of various projections, views, symbols and dimensions of drawing
- KU7.** use of geometric shapes like lines, angles, circles, etc for interpreting the drawing

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read and interpret workplace related drawing
- GS2.** communicate the changes and requirements to supervisor by using relevant drawing terms and nomenclature
- GS3.** attentively listen and comprehend the information given by the supervisor/team members
- GS4.** write in English/regional language
- GS5.** recognise problem in drawing and take suitable action
- GS6.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Interpret information from various views, projection, 2D and 3D shapes</i>	21	11	-	10
PC1. interpret engineering drawing's uniqueness, dimensions and important features in 2D and 3D shapes	5	3	-	2
PC2. identify the difference between 2D and 3D shapes	4	2	-	2
PC3. explain difference between first angle projection and third angle projection in mechanical engineering drawing	4	-	-	2
PC4. interpret all the 3 axes (x, y and z axis) and geometrical shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection	5	3	-	2
PC5. identify details of the machine component which are not clearly visible by interpreting section views	3	3	-	2
<i>Identify drawing standards and symbols</i>	23	15	-	8
PC6. interpret Geometric Dimensioning and Tolerancing (GD&T) symbols in the drawings	6	4	-	2
PC7. interpret symbols of Radius, controlled radius, spherical radius, diameter, spherical diameter, square, counterbore, spotface, depth, countersink, "by", maximum dimension, minimum dimension, reference, dimension origin etc	6	4	-	2
PC8. identify the sequence of operations which enables the selection and prioritization of the datums	5	3	-	2
PC9. read and interpret information from Tolerance Zone boundaries for part features in terms of shape and size	6	4	-	2
<i>Modification and storage of drawing</i>	6	4	-	2

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. observe any modification, changes required in the drawing and communicate the same to the concerned team in the organization	3	2	-	1
PC11. store the drawings in an easily accessible place, avoiding damage from moisture, chemicals and fire	3	2	-	1
NOS Total	50	30	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9805
NOS Name	Interpret engineering drawing
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	4
Credits	1
Version	2.0
Last Reviewed Date	31/08/2021
Next Review Date	31/08/2024
NSQC Clearance Date	31/08/2021

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ASC/N8106: Support the manager in finalising the design specifications and reliability parameters of the product

Description

This NOS is about identifying the product requirements and support the manager in fixing design and reliability parameters of the product.

Scope

The scope covers the following :

- Identify product design requirements
- Support line manager in finalization of design specifications
- Ensure reliability and validity of the product design

Elements and Performance Criteria

Identify product design requirements

To be competent, the user/individual on the job must be able to:

- PC1.** identify product requirements such as customer preferences, benchmarking data, technology parameters etc. received from the Cross Functional Team (CFT)
- PC2.** analyse the type of component (including new component), technology and technique to be used in design of the product
- PC3.** analyse the parameters such as road scenarios, vehicle aesthetic appeal & ergonomics, shape/ size/ environmental impact etc. for design of the product
- PC4.** identify and select simulation tools such as CAD, CAM etc. as per the SOP and job requirements

Support line manager in finalization of design specifications

To be competent, the user/individual on the job must be able to:

- PC5.** support the line manager in creating specifications for design input and requirements of each of the aggregates, circuits, ECU programming, etc.
- PC6.** support in deciding the means for providing design input and requirements of each of the aggregates, circuits, ECU programming, etc.
- PC7.** support in creating a mechanism for capturing design output
- PC8.** ensure that all the required design specifications are achieved and there is conformance between output and input of the design

Ensure reliability and validity of the product design

To be competent, the user/individual on the job must be able to:

- PC9.** identify reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc. with the support on the manager
- PC10.** prioritize key reliability risk items and the corresponding risk reduction strategy with the help of the product design manager
- PC11.** estimate the products design reliability and analyse it by using simulation models, prior warranty and tests data from similar models

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- PC12.** analyse failure risks and mechanics of the product design
- PC13.** use design of experiments methodology to identify factors significant to the life of the vehicle
- PC14.** use Life Data Analysis (LDA) techniques to statistically estimate the reliability of the product design and calculate various reliability-related metrics
- PC15.** conduct Reliability Growth (RG) testing and analyse effective methodology to discover defects and improve the design during/ post testing inputs

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** relevant standards and procedures followed in the company
- KU2.** how to read and interpret basic electrical drawings, controller logic, symbols and wiring layout
- KU3.** procedure that displays design hierarchy
- KU4.** use of simulation tools such as CAD, CAM etc.
- KU5.** different components/aggregates as well as auto component manufacturer's specifications for the same
- KU6.** basic technology used in and functioning of various systems and components of the vehicle such as batteries, body management system, telematics, brake system, air-conditioning systems, active & passive safety system, media and other systems (including electrical machines and devices used in electric vehicles such as: generator, DC/AC and DC/DC converters, AC motor, DC motor, charging systems etc.)
- KU7.** various specifications and parameters required to be finalized for designing of the product
- KU8.** the design of BMS and EMC criteria
- KU9.** process flow of designing the vehicle and its components
- KU10.** how to conduct the failure analysis
- KU11.** impact of each cause of failure on vehicle
- KU12.** high performance HMI (Human Machine Interface) philosophy and style guide with proper principles
- KU13.** functioning of telematics system
- KU14.** testing and validation of the simulation
- KU15.** documents and records needed to be maintained
- KU16.** fundamental terms, laws and principles of electricity used in EV such as: principles of storing electrical voltage, ohms law, voltage, current (AC/DC/HV), resistance, power, capacitance, electrostatics, magnetic, inductance, discrete electronic components, and radio frequency (automotive digital computers, automotive communication protocols such as CAN, LIN, etc.)
- KU17.** different parameters used to evaluate the performance of the design
- KU18.** how to check reliability and validity of the product design

Generic Skills (GS)

User/individual on the job needs to know how to:

Qualification Pack

- GS1.** read and interpret drawings, work instructions, equipment manuals and process documents
- GS2.** read policies and regulations pertinent to the job, including OEM guidelines, Health and Safety instructions etc. while working on the Electric Vehicle and its aggregates
- GS3.** communicate the assembly process requirements to the lead technician and co-workers
- GS4.** communicate issues to the supervisor that occur during assembling process
- GS5.** attentively listen and comprehend the information given by the lead technician/team members
- GS6.** write any work related information in English/regional language
- GS7.** recognise a workplace problem and take suitable action
- GS8.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS9.** plan and organise work according to the work requirements
- GS10.** complete the assigned tasks with minimum supervision
- GS11.** report to the supervisor or deal with a colleague individually, depending on the type of concern

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Identify product design requirements</i>	9	15	-	6
PC1. identify product requirements such as customer preferences, benchmarking data, technology parameters etc. received from the Cross Functional Team (CFT)	2	4	-	2
PC2. analyse the type of component (including new component), technology and technique to be used in design of the product	2	3	-	1
PC3. analyse the parameters such as road scenarios, vehicle aesthetic appeal & ergonomics, shape/ size/ environmental impact etc. for design of the product	3	4	-	2
PC4. identify and select simulation tools such as CAD, CAM etc. as per the SOP and job requirements	2	4	-	1
<i>Support line manager in finalization of design specifications</i>	7	9	-	5
PC5. support the line manager in creating specifications for design input and requirements of each of the aggregates, circuits, ECU programming, etc.	2	2	-	1
PC6. support in deciding the means for providing design input and requirements of each of the aggregates, circuits, ECU programming, etc.	2	3	-	2
PC7. support in creating a mechanism for capturing design output	2	2	-	1
PC8. ensure that all the required design specifications are achieved and there is conformance between output and input of the design	1	2	-	1
<i>Ensure reliability and validity of the product design</i>	14	26	-	9
PC9. identify reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc. with the support on the manager	2	4	-	2

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. prioritize key reliability risk items and the corresponding risk reduction strategy with the help of the product design manager	2	3	-	1
PC11. estimate the products design reliability and analyse it by using simulation models, prior warranty and tests data from similar models	2	4	-	2
PC12. analyse failure risks and mechanics of the product design	2	3	-	1
PC13. use design of experiments methodology to identify factors significant to the life of the vehicle	2	4	-	1
PC14. use Life Data Analysis (LDA) techniques to statistically estimate the reliability of the product design and calculate various reliability-related metrics	2	4	-	1
PC15. conduct Reliability Growth (RG) testing and analyse effective methodology to discover defects and improve the design during/ post testing inputs	2	4	-	1
NOS Total	30	50	-	20

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8106
NOS Name	Support the manager in finalising the design specifications and reliability parameters of the product
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Designing
NSQF Level	4.5
Credits	6
Version	2.0
Last Reviewed Date	NA
Next Review Date	30/09/2024
NSQC Clearance Date	30/09/2021

Qualification Pack

ASC/N8107: Design Vehicles and components using simulation tools

Description

This NOS is about designing vehicles using standard electronics simulation tools along with ensuing circuit design, telematics, human machine interface aspects are also taken into consideration.

Scope

The scope covers the following :

- Design the vehicle/components using simulation tools
- Conduct electronic design failure analysis
- Perform simulations on the product design
- Complete process pertaining to telematics and human machine interface for product design
- Manage product design data

Elements and Performance Criteria

Design the vehicle/components using simulation tools

To be competent, the user/individual on the job must be able to:

- PC1.** transform the functional architecture of vehicle design to physical architecture with the support of line manager
- PC2.** create EV product designs as per the defined geometrical parameters which can be readily altered by changing relevant parameters
- PC3.** use organisation recommended simulation tools, software and applications to perform designing
- PC4.** build a simulated model of the EV design as per the engineering inputs, customer requirements and product necessities
- PC5.** analyse suspension and structural strength, correct tolerance limits of electronic components etc. of the design
- PC6.** analyse the model using different loads to check and validate the design
- PC7.** incorporate smaller circuits like clippers, clampers, current/ voltage boosters, signal conditioner circuits, etc. in the design
- PC8.** incorporate different sensors and actuators to monitor the different electronic parameters in the design
- PC9.** use BMS software validation and simulation along with battery points like basic, runtime, impedance, 1st principle modelling
- PC10.** support line manager to create and validate the standardized Work Analysis Sheet to see the same basic processes are used in the simulation

Conduct electronic design failure analysis

To be competent, the user/individual on the job must be able to:

- PC11.** create failure modes in the simulation model to identify all possible failure scenarios
- PC12.** identify the potential root causes and consequence of each failure mode
- PC13.** create a rating system (0 to 10) to identify the seriousness of each cause

Qualification Pack

PC14. identify current process controls that are applicable, controls that can be established and detection rating (DR) for each cause

PC15. identify and implement recommended actions (design changes) to lower the severity or occurrence of each cause

Perform simulations on the product design

To be competent, the user/individual on the job must be able to:

PC16. formulate simulation model to check the architectural design with the support of line manager

PC17. run the simulation to test the model

PC18. analyse results of test by comparing behaviour with the actual environment and then make changes accordingly in the model

PC19. validate simulation by increasing the chances that the model will be valid in the real world like crash simulation, chassis, power steering, battery pack, etc.

PC20. create a standardized work combination sheet to see the processes used, work sequence order and changes done after failure analysis in the simulation

Complete process pertaining to telematics and human machine interface for product design

To be competent, the user/individual on the job must be able to:

PC21. validate that telematics system can analyse drivers sense of driving and follows the design requirements

PC22. use high performance HMI (Human Machine Interface) to achieve specific performance and goal objectives/targets for process control such as safety parameters, production rate, efficiency, cost, and quality

PC23. analyse controls that must be monitored and manipulated to achieve the performance and goal objectives

PC24. design high performance graphics by following the HMI and addressing the identified tasks

PC25. install, commission and provide training on the new HMI

PC26. control, maintain and periodically re-assess the HMI performance

Manage product design data

To be competent, the user/individual on the job must be able to:

PC27. collect information regarding the product design, product structure management, product material, process management of the product etc.

PC28. maintain and store the information and records regarding product development and tools to be used as per SOP

PC29. maintain the data related to history, present use, serialization, part status, customer preference etc. related to the product as per SOP

PC30. ensure planning and control of the entire system through status control reports, meetings reviews, etc.

PC31. ensure continued system integration and validation of the data captured

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

Qualification Pack

- KU2.** how to read and interpret basic electrical drawings, controller logic, symbols and wiring layout
- KU3.** procedure that displays design hierarchy
- KU4.** use of simulation tools such as CAD, CAM etc.
- KU5.** different components/aggregates as well as auto component manufacturer's specifications for the same
- KU6.** basic technology used in and functioning of various systems and components of the vehicle such as batteries, body management system, telematics, brake system, air-conditioning systems, active & passive safety system, media and other systems (including electrical machines and devices used in electric vehicles such as: generator, DC/AC and DC/DC converters, AC motor, DC motor, charging systems etc.)
- KU7.** the vehicle integration and calibration
- KU8.** the design of BMS and EMC criteria
- KU9.** process flow of designing the vehicle and its components
- KU10.** how to conduct the failure analysis
- KU11.** impact of each cause of failure on vehicle
- KU12.** high performance HMI (Human Machine Interface) philosophy and style guide with proper principles
- KU13.** functioning of telematics system
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- KU15.** documents and records need to be maintained
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- KU17.** different parameters used to evaluate the performance of the design

Generic Skills (GS)

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- GS1.** read and interpret drawings, work instructions, equipment manuals and process documents
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- GS10.** complete the assigned tasks with minimum supervision



Qualification Pack

GS11. report to the supervisor or deal with a colleague individually, depending on the type of concern

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Design the vehicle/components using simulation tools</i>	11	11	-	8
PC1. transform the functional architecture of vehicle design to physical architecture with the support of line manager	1	1	-	1
PC2. create EV product designs as per the defined geometrical parameters which can be readily altered by changing relevant parameters	1	1	-	1
PC3. use organisation recommended simulation tools, software and applications to perform designing	2	2	-	1
PC4. build a simulated model of the EV design as per the engineering inputs, customer requirements and product necessities	1	1	-	1
PC5. analyse suspension and structural strength, correct tolerance limits of electronic components etc. of the design	1	1	-	1
PC6. analyse the model using different loads to check and validate the design	1	1	-	1
PC7. incorporate smaller circuits like clippers, clampers, current/ voltage boosters, signal conditioner circuits, etc. in the design	1	1	-	-
PC8. incorporate different sensors and actuators to monitor the different electronic parameters in the design	1	1	-	-
PC9. use BMS software validation and simulation along with battery points like basic, runtime, impedance, 1st principle modelling	1	1	-	1
PC10. support line manager to create and validate the standardized Work Analysis Sheet to see the same basic processes are used in the simulation	1	1	-	1
<i>Conduct electronic design failure analysis</i>	5	11	-	5
PC11. create failure modes in the simulation model to identify all possible failure scenarios	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. identify the potential root causes and consequence of each failure mode	1	2	-	1
PC13. create a rating system (0 to 10) to identify the seriousness of each cause	1	2	-	1
PC14. identify current process controls that are applicable, controls that can be established and detection rating (DR) for each cause	1	3	-	1
PC15. identify and implement recommended actions (design changes) to lower the severity or occurrence of each cause	1	2	-	1
<i>Perform simulations on the product design</i>	4	10	-	3
PC16. formulate simulation model to check the architectural design with the support of line manager	1	2	-	1
PC17. run the simulation to test the model	1	2	-	-
PC18. analyse results of test by comparing behaviour with the actual environment and then make changes accordingly in the model	1	2	-	1
PC19. validate simulation by increasing the chances that the model will be valid in the real world like crash simulation, chassis, power steering, battery pack, etc.	1	2	-	1
PC20. create a standardized work combination sheet to see the processes used, work sequence order and changes done after failure analysis in the simulation	-	2	-	-
<i>Complete process pertaining to telematics and human machine interface for product design</i>	6	11	-	3
PC21. validate that telematics system can analyse drivers sense of driving and follows the design requirements	1	2	-	1
PC22. use high performance HMI (Human Machine Interface) to achieve specific performance and goal objectives/targets for process control such as safety parameters, production rate, efficiency, cost, and quality	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. analyse controls that must be monitored and manipulated to achieve the performance and goal objectives	1	1	-	1
PC24. design high performance graphics by following the HMI and addressing the identified tasks	1	2	-	-
PC25. install, commission and provide training on the new HMI	1	2	-	-
PC26. control, maintain and periodically re-assess the HMI performance	1	2	-	-
<i>Manage product design data</i>	4	7	-	1
PC27. collect information regarding the product design, product structure management, product material, process management of the product etc.	1	2	-	1
PC28. maintain and store the information and records regarding product development and tools to be used as per SOP	1	2	-	-
PC29. maintain the data related to history, present use, serialization, part status, customer preference etc. related to the product as per SOP	1	1	-	-
PC30. ensure planning and control of the entire system through status control reports, meetings reviews, etc.	-	1	-	-
PC31. ensure continued system integration and validation of the data captured	1	1	-	-
NOS Total	30	50	-	20

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8107
NOS Name	Design Vehicles and components using simulation tools
Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Designing
NSQF Level	4.5
Credits	6
Version	2.0
Last Reviewed Date	NA
Next Review Date	30/09/2024
NSQC Clearance Date	30/09/2021

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training centre based on these criteria.
5. In case of successfully passing only certain number of NOSs, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.
6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Qualification Pack

Minimum Aggregate Passing % at QP Level : 70

(Please note: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N9810.Manage work and resources (Manufacturing)	50	30	-	20	100	10
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	5
ASC/N9805.Interpret engineering drawing	50	30	-	20	100	10
ASC/N8106.Support the manager in finalising the design specifications and reliability parameters of the product	30	50	-	20	100	35
ASC/N8107.Design Vehicles and components using simulation tools	30	50	-	20	100	40
Total	180	190	-	80	450	100

Qualification Pack

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
PwD	Persons with Disability
SOP	Standard Operating Procedure
GD&T	Geometric Dimensioning & Tolerancing
CAD	Computer-Aided Drafting
CAM	Computer-Aided Manufacturing
CFT	Cross Functional Team
ECU	Electronic Control Unit
LDA	Life Data Analysis
RG	Reliability Growth
HMI	Human Machine Interface
HMI	Human Machine Interface
SOP	Standard Operating Procedure
GD&T	Geometric Dimensioning & Tolerancing
CAD	Computer-Aided Drafting
CAM	Computer-Aided Manufacturing
CFT	Cross Functional Team
ECU	Electronic Control Unit
LDA	Life Data Analysis
RG	Reliability Growth
HMI	Human Machine Interface
HMI	Human Machine Interface

Qualification Pack

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Qualification Pack

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.