



# Automotive Product Design Lead Engineer

QP Code: ASC/Q8102

Version: 2.0

NSQF Level: 6

Automotive Skills Development Council || 153, Gr Floor, Okhla Industrial Area, Phase - III, Leela Building  
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## ASC/Q8102: Automotive Product Design Lead Engineer

### Brief Job Description

Individual at this job is responsible for designing the product using CAD & CAE systems by understanding all the product requirements. The role is also responsible for supporting the manager in ensuring that the designed product includes aspects related to telematics, human machine interface, ergonomics and design FMEA.

### Personal Attributes

The person should be organised, team-oriented and have the ability to work independently for long hours in adverse conditions. They should be result-oriented, 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. [ASC/N9813: Manage work and resources](#)
3. [ASC/N8102: Explaining the product requirements, support the manager in finalizing the design specifications and reliability parameters of the product](#)
4. [ASC/N8103: Design vehicles & components using computer aided technology](#)
5. [ASC/N8104: Manage the product data and system integration mechanism](#)
6. [ASC/N8108: Perform the component designing operation for 3D manufacturing machine.](#)
7. [ASC/N6811: Select and operate 3D Printing machine for product generation](#)

### Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Research & Development
Occupation	Automotive Product Designing
Country	India
NSQF Level	6

<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/2144.0803
<b>Minimum Educational Qualification &amp; Experience</b>	<p>3 years Diploma (Mechanical/Automobile/ Electrical / Electronics) from recognized regulatory body with 3 years of relevant experience after class 12th</p> <p>OR</p> <p>B.E./B.Tech (Mechanical/Automobile / Electrical/ Electronics Engineering) with 1 Year of relevant experience,</p> <p>OR</p> <p>M.E./M.Tech (Mechanical/Automobile / Electrical/ Electronics Engineering)</p>
<b>Minimum Level of Education for Training in School</b>	
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	23 Years
<b>Last Reviewed On</b>	30/09/2021
<b>Next Review Date</b>	30/09/2024
<b>NSQC Approval Date</b>	30/09/2021
<b>Version</b>	2.0

## 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

#### *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)**

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

## 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
PC12. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1



Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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>	<b>6</b>	<b>4</b>	-	<b>1</b>
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>	<b>11</b>	<b>6</b>	-	<b>6</b>
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
<b>NOS Total</b>	<b>50</b>	<b>30</b>	-	<b>20</b>

## 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	6
Credits	TBD
Version	1.0
Last Reviewed On	30/09/2021
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## ASC/N9812: Interact effectively with team, customers and others

### Description

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

### Scope

The scope covers the following :

- Maintain safe and secure working environment
- Ensure work as per quality standards
- Material/energy/electricity conservation practices
- Effective waste management/recycling practices
- Ensure a healthy and hygienic workplace

### Elements and Performance Criteria

#### *Maintain safe and secure working environment*

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

- PC1. ensure that the team complies with organisation's health, safety, security policies and procedures
- PC2. identify the risks and hazards associated with work activities, their causes and prevention as per organisation's policy
- PC3. encourage team to report any identified breaches in health, safety, and security policies and procedures to the designated person

#### *Ensure work as per quality standards*

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

- PC4. ensure work area is kept clean and tidy
- PC5. identify individual work requirements and provide necessary instructions to the team
- PC6. ensure the team works as per the assigned and agreed requirements
- PC7. identify work which fails the requirements, specified quality standards and ensure timely corrective action is taken
- PC8. implement ways and guide the team to manage time, resources and cost effectively
- PC9. train the team on skill level advancement to develop expertise in their work
- PC10. ensure that the team understands accountability for timely completion of tasks
- PC11. analyse and validate the problem accurately and communicate different possible solutions to the problem

#### *Material/energy/electricity conservation practices*

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

- PC12. identify ways to optimize usage of electricity/other source of energy and material including water in various tasks/activities/processes
- PC13. ensure that the team uses resources in a responsible manner
- PC14. ensure that the team periodically checks for spills/leakages around the work area and take corrective actions or escalate to appropriate authority if unable to rectify

- PC15. supervise team to carry out routine cleaning of tools, machine and equipment
- PC16. ensure that the team periodically checks if the equipment/machines are maintained and functioning normally before commencing work and take corrective action wherever required

#### *Effective waste management/recycling practices*

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

- PC17. identify recyclable, non-recyclable and hazardous waste generated
- PC18. ensure the team segregates waste into different categories
- PC19. ensure proper disposal of non-recyclable waste
- PC20. ensure recyclable and reusable material is deposited at identified location
- PC21. ensure the team follows processes specified for disposal of hazardous waste

#### *Ensure a healthy and hygienic workplace*

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

- PC22. ensure workplace, equipment, restrooms etc. are sanitized regularly
- PC23. promote awareness about hygiene and sanitation regulations
- PC24. check availability of running water, hand wash and alcohol-based sanitizers at workplace
- PC25. support employees to cope with stress, anxiety etc.
- PC26. wear and dispose PPEs regularly and appropriately

### **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

- KU1. different types of health and safety hazards that can be found in the workplace, risks and threats based on the nature of work
- KU2. company defined workplace hazards and rules/regulation for maintaining health, safety and security at workplace
- KU3. breaches in health, safety and security as well as procedures to report the same
- KU4. workshop layout with electrical, hydraulic and thermal equipment used
- KU5. the organisation's emergency procedures for different emergency situations and the importance of following the same
- KU6. ways of time and cost management
- KU7. ways to manage efficient utilisation of energy, material and water in the process
- KU8. ways to recognize common electrical problems and common practices of conserving electricity
- KU9. usage of different colours of dustbins and categorization of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics
- KU10. organisations procedures for minimizing waste
- KU11. waste management and methods of waste disposal
- KU12. common sources of pollution and ways to minimize it
- KU13. different ways for skill level advancement to develop expertise
- KU14. key performance indicators for the new tasks
- KU15. timelines and goals set by the manager
- KU16. importance of quality and timely delivery of the product/service

KU17. organisation's policies to maintain personal health and hygiene at workplace

KU18. significance of greening

## **Generic Skills (GS)**

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

- GS1. read instructions/guidelines/procedures
- GS2. listen effectively and orally communicate information
- GS3. ask for clarification and advice from the concerned person
- GS4. maintain positive and effective relationships with colleagues and customers
- GS5. evaluate the possible solution(s) to the problem
- GS6. complete written work with attention to detail
- GS7. modify work practices to improve them
- GS8. work with supervisors/team members to carry out work related tasks
- GS9. complete tasks efficiently and accurately within stipulated time
- GS10. make timely decisions for efficient utilization of resources
- GS11. be punctual and utilize time
- GS12. evaluate strategies to maintain, enhance or reduce the intensity of heightened emotional response

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Maintain safe and secure working environment</i>	7	5	-	4
PC1. ensure that the team complies with organisation's health, safety, security policies and procedures	2	2	-	1
PC2. identify the risks and hazards associated with work activities, their causes and prevention as per organisation's policy	3	2	-	2
PC3. encourage team to report any identified breaches in health, safety, and security policies and procedures to the designated person	2	1	-	1
<i>Ensure work as per quality standards</i>	15	8	-	5
PC4. ensure work area is kept clean and tidy	2	1	-	-
PC5. identify individual work requirements and provide necessary instructions to the team	2	1	-	1
PC6. ensure the team works as per the assigned and agreed requirements	1	1	-	-
PC7. identify work which fails the requirements, specified quality standards and ensure timely corrective action is taken	3	2	-	2
PC8. implement ways and guide the team to manage time, resources and cost effectively	2	-	-	-
PC9. train the team on skill level advancement to develop expertise in their work	2	1	-	1
PC10. ensure that the team understands accountability for timely completion of tasks	2	-	-	-
PC11. analyse and validate the problem accurately and communicate different possible solutions to the problem	1	2	-	1
<i>Material/energy/electricity conservation practices</i>	10	6	-	4
PC12. identify ways to optimize usage of electricity/other source of energy and material including water in various tasks/activities/processes	2	2	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. ensure that the team uses resources in a responsible manner	2	1	-	-
PC14. ensure that the team periodically checks for spills/leakages around the work area and take corrective actions or escalate to appropriate authority if unable to rectify	2	1	-	1
PC15. supervise team to carry out routine cleaning of tools, machine and equipment	2	1	-	-
PC16. ensure that the team periodically checks if the equipment/machines are maintained and functioning normally before commencing work and take corrective action wherever required	2	1	-	1
<i>Effective waste management/recycling practices</i>	10	6	-	4
PC17. identify recyclable, non-recyclable and hazardous waste generated	2	2	-	1
PC18. ensure the team segregates waste into different categories	2	1	-	1
PC19. ensure proper disposal of non-recyclable waste	2	1	-	-
PC20. ensure recyclable and reusable material is deposited at identified location	2	1	-	1
PC21. ensure the team follows processes specified for disposal of hazardous waste	2	1	-	1
<i>Ensure a healthy and hygienic workplace</i>	8	5	-	3
PC22. ensure workplace, equipment, restrooms etc. are sanitized regularly	2	1	-	-
PC23. promote awareness about hygiene and sanitation regulations	2	1	-	1
PC24. check availability of running water, hand wash and alcohol-based sanitizers at workplace	1	1	-	-
PC25. support employees to cope with stress, anxiety etc.	1	1	-	1
PC26. wear and dispose PPEs regularly and appropriately	2	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	50	30	-	20



## National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9812
NOS Name	Interact effectively with team, customers and others
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	6
Credits	TBD
Version	1.0
Last Reviewed On	30/09/2021
Next Review Date	30/09/2024
NSQC Approval Date	30/09/2021

## ASC/N8102: Explaining the product requirements, support the manager in finalizing the design specifications and reliability parameters of the product

### Description

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

### Scope

The scope covers the following :

- Showing product requirements fixed by the CFT Team
- Creation of basic product design
- Support in finalization of design specification
- Support in ensuring reliability and validity of the product design

### Elements and Performance Criteria

#### *Understanding product requirements fixed by the CFT Team*

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

- PC1. analyse product requirements fixed by the CFT Team like basic customer preferences, benchmarking data, technology parameters etc.
- PC2. examine the type of material (including new material) to be used
- PC3. analyse the technology and technique to be used in the design of the product
- PC4. discuss and create a picture/image of the design
- PC5. ensure aspects of aesthetic appeal, ergonomics etc. while designing the physical product
- PC6. define the shape/ size/ environmental impact of the design

#### *Creation of basic product design*

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

- PC7. create a freehand sketch/silhouette on the basis of image of the product design
- PC8. select the procedure that displays design hierarchy
- PC9. use mechanical CAD (Computer Aided Design) system to generate design geometry
- PC10. produce a grid map of the vehicle on a 1:1 scale including all its technical and structural constituents on the basis of the initial sketches

#### *Support in finalization of design specifications*

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

- PC11. support in creation of design input specifications and requirement specifications for each of the aggregates, body of the vehicle etc.
- PC12. support the manager in achieving the required specification of the product and ensure conformance between design output and design input
- PC13. support the manager in deciding the means for providing design input and also, support the manager in deciding the means of demonstration that each requirement has been met
- PC14. support in creating a mechanism for capturing design output

**PC15.** develop a Quality Cost Delivery analysis for all decision metrics relating to developing the body of the car and the cost involved.

**PC16.** support the manager in defining elements related to colour design (interior and exterior) through analysis of a range of data including what colours are in vogue in the fields of fashion and interior design around the world

*Support in ensuring reliability and validity of the product design*

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

**PC17.** define reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc. in coordination with the manager

**PC18.** list key reliability risk items and the corresponding risk reduction strategy with the help of the product design manager

**PC19.** estimate the products design reliability and analyse product reliability using simulation models, prior warranty and tests data from similar models

**PC20.** analyse failure risks and mechanics and use the design of experiments methodology to identify factors significant to the life of the vehicle

**PC21.** use Life Data Analysis (LDA) techniques to statistically estimate the reliability of the product design and calculate various reliability-related metrics

**PC22.** perform 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.** company manufacturing processes & the equipment in use

**KU2.** sequence of operations for each process

**KU3.** type of automotive systems being used for the process

**KU4.** electrical-wiring drawings of existing layout/equipment/systems

**KU5.** latest technologies and regulations in auto industry

**KU6.** QMS requirements

**KU7.** trouble shooting/fault finding in pneumatic, hydraulic, electrical control system elements

**KU8.** problem solving techniques- TOPS 8D, 7 QC tools etc.

**KU9.** robotic instruments used during the process

## **Generic Skills (GS)**

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

**GS1.** communicate effectively at the workplace

**GS2.** attentively listen and comprehend the information given by the process managers

**GS3.** write observations and any work related information in English/regional language

**GS4.** recognise a workplace problem and take suitable action

**GS5.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

**GS6.** complete the assigned tasks in a timely and efficient manner

GS7. coordinate with shop floor workers and team for installing the new systems efficiently

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Understanding product requirements fixed by the CFT Team</i>	11	14	-	4
PC1. analyse product requirements fixed by the CFT Team like basic customer preferences, benchmarking data, technology parameters etc.	2	2	-	-
PC2. examine the type of material (including new material) to be used	2	3	-	2
PC3. analyse the technology and technique to be used in the design of the product	2	3	-	2
PC4. discuss and create a picture/image of the design	2	2	-	-
PC5. ensure aspects of aesthetic appeal, ergonomics etc. while designing the physical product	2	2	-	-
PC6. define the shape/ size/ environmental impact of the design	1	2	-	-
<i>Creation of basic product design</i>	8	10	-	7
PC7. create a freehand sketch/silhouette on the basis of image of the product design	2	2	-	2
PC8. select the procedure that displays design hierarchy	2	2	-	-
PC9. use mechanical CAD (Computer Aided Design) system to generate design geometry	2	2	-	2
PC10. produce a grid map of the vehicle on a 1:1 scale including all its technical and structural constituents on the basis of the initial sketches	2	4	-	3
<i>Support in finalization of design specifications</i>	10	14	-	5
PC11. support in creation of design input specifications and requirement specifications for each of the aggregates, body of the vehicle etc.	2	4	-	3

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. support the manager in achieving the required specification of the product and ensure conformance between design output and design input	1	2	-	-
PC13. support the manager in deciding the means for providing design input and also, support the manager in deciding the means of demonstration that each requirement has been met	2	2	-	1
PC14. support in creating a mechanism for capturing design output	1	1	-	-
PC15. develop a Quality Cost Delivery analysis for all decision metrics relating to developing the body of the car and the cost involved.	2	3	-	1
PC16. support the manager in defining elements related to colour design (interior and exterior) through analysis of a range of data including what colours are in vogue in the fields of fashion and interior design around the world	2	2	-	-
<i>Support in ensuring reliability and validity of the product design</i>	11	2	-	4
PC17. define reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc. in coordination with the manager	2	-	-	-
PC18. list key reliability risk items and the corresponding risk reduction strategy with the help of the product design manager	1	-	-	-
PC19. estimate the products design reliability and analyse product reliability using simulation models, prior warranty and tests data from similar models	2	-	-	-
PC20. analyse failure risks and mechanics and use the design of experiments methodology to identify factors significant to the life of the vehicle	2	-	-	1
PC21. use Life Data Analysis (LDA) techniques to statistically estimate the reliability of the product design and calculate various reliability-related metrics	2	-	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. perform Reliability Growth (RG) testing and analyse effective methodology to discover defects and improve the design during/post testing inputs	2	2	-	2
<b>NOS Total</b>	<b>40</b>	<b>40</b>	<b>-</b>	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N8102
<b>NOS Name</b>	Explaining the product requirements, support the manager in finalizing the design specifications and reliability parameters of the product
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Research & Development
<b>Occupation</b>	Automotive Product Designing
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	2.0
<b>Last Reviewed On</b>	30/09/2021
<b>Next Review Date</b>	30/09/2024
<b>NSQC Approval Date</b>	30/09/2021



## ASC/N8103: Design vehicles & components using computer aided technology

### Description

This NOS is about designing vehicles using computer aided technology along with ensuing design FMEA, telematics, human machine interface aspects are also taken into consideration

### Scope

The scope covers the following :

- Designing the vehicle using CAD/CAE
- Conducting design FMEA
- Performing simulations on the product design
- Complete process pertaining to telematics and human machine interface for product design

### Elements and Performance Criteria

#### *Design the vehicle using CAD/CAE*

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

- PC1. analyze the application of CAD (Computer Aided Design) and CAE (Computer Aided Engineering) and support the manager in transforming the functional architecture to physical architecture.
- PC2. create product designs as per the defined geometrical parameters which can be readily altered by changing relevant parameters
- PC3. create 2D/3D model using CAD/CAE along with engineering inputs, customer requirements and product necessities using the modeling section of the software.
- PC4. analyse the model using loads to check and validate the design and translating the clay model into a CAD design for real time view
- PC5. prepare design of the smaller parts to check if they all fit and add to structural viability
- PC6. apply engineering parameters related to speed, cutting pattern, coolant information etc. to the CAD/CAE

#### *Conduct design FMEA (Failure Mode Effect Analysis)*

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

- PC7. identify the purpose of the design and identify all the ways the failure could happen (creation of failure modes)
- PC8. identify the consequence of each failure mode and determine the seriousness of each effect
- PC9. create a rating system (0 to 10) to identify how serious each effect is and for each failure mode determine the potential root causes
- PC10. determine O (occurrence rating) between 0 and 10 for each cause
- PC11. identify current process controls that are applicable and for each cause, identify controls that can be established for each cause
- PC12. determine D (detection rating) and identify recommended actions (design changes) to lower severity or occurrence for each control

#### *Perform simulations on the product design*

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

PC13. check for architectural design verification

PC14. formulate simulation model to be used with the support of the manager

PC15. test the model and compare behaviour with that of the actual problem environment

PC16. perform the simulation, analyse results and make changes accordingly

PC17. perform simulation again to test the new solution

PC18. analyze and validate simulation to increase the chances that the simulation will be valid in the real world

*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:

PC19. analyse and validate that telematics follows requirements and ensure telematics system can analyse drivers sense of driving

PC20. select and a high-performance HMI (Human Machine Interface) philosophy and style guide with proper principles

PC21. determine specific performance and goal objectives/targets for process control, such as safety parameters, production rate, efficiency, cost, and quality

PC22. analyse controls that must be monitored and manipulated to achieve performance

PC23. prepare Design for high-performance graphics, following the HMI philosophy, addressing the identified tasks.

PC24. provide training on the new HMI and control, maintain, and periodically reassess the HMI performance

## **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

KU1. company manufacturing processes & the equipment in use

KU2. sequence of operations for each process

KU3. type of automotive systems being used for the process

KU4. electrical-wiring drawings of existing layout/equipment/systems

KU5. QMS requirements

KU6. trouble shooting/fault finding in pneumatic, hydraulic, electrical control system elements

KU7. problem solving techniques- TOPS 8D, 7 QC tools etc.

## **Generic Skills (GS)**

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

GS1. communicate effectively at the workplace

GS2. attentively listen and comprehend the information given by the process managers

GS3. write observations and any work related information in English/regional language

GS4. recognise a workplace problem and take suitable action

GS5. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

GS6. complete the assigned tasks in a timely and efficient manner

GS7. coordinate with shop floor workers and team for installing the new systems efficiently

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Design the vehicle using CAD/CAE</i>	8	16	-	8
PC1. analyze the application of CAD (Computer Aided Design) and CAE (Computer Aided Engineering) and support the manager in transforming the functional architecture to physical architecture.	2	2	-	1
PC2. create product designs as per the defined geometrical parameters which can be readily altered by changing relevant parameters	1	2	-	1
PC3. create 2D/3D model using CAD/CAE along with engineering inputs, customer requirements and product necessities using the modeling section of the software.	1	4	-	2
PC4. analyse the model using loads to check and validate the design and translating the clay model into a CAD design for real time view	1	4	-	2
PC5. prepare design of the smaller parts to check if they all fit and add to structural viability	1	2	-	2
PC6. apply engineering parameters related to speed, cutting pattern, coolant information etc. to the CAD/CAE	2	2	-	-
<i>Conduct design FMEA (Failure Mode Effect Analysis)</i>	11	6	-	4
PC7. identify the purpose of the design and identify all the ways the failure could happen (creation of failure modes)	2	1	-	-
PC8. identify the consequence of each failure mode and determine the seriousness of each effect	2	1	-	-
PC9. create a rating system (0 to 10) to identify how serious each effect is and for each failure mode determine the potential root causes	2	-	-	1
PC10. determine O (occurrence rating) between 0 and 10 for each cause	2	1	-	-
PC11. identify current process controls that are applicable and for each cause, identify controls that can be established for each cause	2	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. determine D (detection rating) and identify recommended actions (design changes) to lower severity or occurrence for each control	1	2	-	2
<i>Perform simulations on the product design</i>	<b>9</b>	<b>12</b>	-	<b>7</b>
PC13. check for architectural design verification	1	4	-	2
PC14. formulate simulation model to be used with the support of the manager	1	2	-	1
PC15. test the model and compare behaviour with that of the actual problem environment	1	2	-	2
PC16. perform the simulation, analyse results and make changes accordingly	2	2	-	1
PC17. perform simulation again to test the new solution	2	2	-	1
PC18. analyze and validate simulation to increase the chances that the simulation will be valid in the real world	2	-	-	-
<i>Complete process pertaining to telematics and human machine interface for product design</i>	<b>12</b>	<b>6</b>	-	<b>1</b>
PC19. analyse and validate that telematics follows requirements and ensure telematics system can analyse drivers sense of driving	2	-	-	-
PC20. select and a high-performance HMI (Human Machine Interface) philosophy and style guide with proper principles	2	-	-	-
PC21. determine specific performance and goal objectives/targets for process control, such as safety parameters, production rate, efficiency, cost, and quality	2	2	-	1
PC22. analyse controls that must be monitored and manipulated to achieve performance	2	-	-	-
PC23. prepare Design for high-performance graphics, following the HMI philosophy, addressing the identified tasks.	2	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. provide training on the new HMI and control, maintain, and periodically reassess the HMI performance	2	2	-	-
<b>NOS Total</b>	<b>40</b>	<b>40</b>	<b>-</b>	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N8103
<b>NOS Name</b>	Design vehicles & components using computer aided technology
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Research & Development
<b>Occupation</b>	Automotive Product Designing
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	2.0
<b>Last Reviewed On</b>	30/09/2021
<b>Next Review Date</b>	30/09/2024
<b>NSQC Approval Date</b>	30/09/2021

## ASC/N8104: Manage the product data and system integration mechanism

### Description

This NOS is about managing the product data and system integration mechanism

### Scope

The scope covers the following :

- Support in creating standardization for capturing work analysis
- Ensure management of product design data
- Ensure system integration mechanism are in place

### Elements and Performance Criteria

#### *Support in creating standardization for capturing work analysis*

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

- PC1. support in creation of a standardized Work Analysis Sheet to see the same basic processes are used
- PC2. ensure validation of the work analysis sheet
- PC3. define the time to check that the processes are being conducted within the specified amount of time
- PC4. create a Standardized work combination sheet
- PC5. identify the work sequence order
- PC6. define the applicability of different processes to be used

#### *Ensure management of product design data*

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

- PC7. identify the product and information regarding the product design
- PC8. identify product structure management- product material, process management of the product
- PC9. identify and store information regarding product development and tools to be used
- PC10. change control and change assessment management in case of any changes to the product design data
- PC11. generate status regarding the product like its history, present use, serialization, part status, customer data

#### *Ensure system integration mechanism are in place*

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

- PC12. support in creation of a system integration team who help integrate all the parts of the product design data
- PC13. ensure planning and control of the entire system through status control reports, meetings reviews etc.
- PC14. ensure continued system integration and validating of the data captured

### Knowledge and Understanding (KU)



The individual on the job needs to know and understand:

- KU1. sequence of operations for each process
- KU2. type of systems used in the process
- KU3. process control and automation systems installed for the processes
- KU4. eligible vendor database for the process and automation systems
- KU5. existing layout of the processes
- KU6. electrical wiring drawings of existing layout/equipment/systems
- KU7. operation of electrical equipments viz motors etc. being used for the process
- KU8. Quality Management System (QMS) requirements
- KU9. protocol & standards for new system installation of the company
- KU10. PLC, SCADA & electrical elements operation and testing
- KU11. trouble shooting & fault finding for all the systems

### Generic Skills (GS)

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

- GS1. read the information displayed at the workplace
- GS2. recognise a workplace problem and take suitable action
- GS3. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS4. communicate effectively at the workplace
- GS5. attentively listen and comprehend the information given by the process managers
- GS6. write observations and any work related information in English/regional language
- GS7. complete assigned tasks in a timely and efficient manner

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Support in creating standardization for capturing work analysis</i>	24	28	-	12
PC1. support in creation of a standardized Work Analysis Sheet to see the same basic processes are used	4	5	-	3
PC2. ensure validation of the work analysis sheet	4	3	-	-
PC3. define the time to check that the processes are being conducted within the specified amount of time	5	5	-	4
PC4. create a Standardized work combination sheet	5	5	-	4
PC5. identify the work sequence order	2	5	-	1
PC6. define the applicability of different processes to be used	4	5	-	-
<i>Ensure management of product design data</i>	13	7	-	6
PC7. identify the product and information regarding the product design	2	3	-	5
PC8. identify product structure management-product material, process management of the product	4	2	-	-
PC9. identify and store information regarding product development and tools to be used	3	-	-	1
PC10. change control and change assessment management in case of any changes to the product design data	2	-	-	-
PC11. generate status regarding the product like its history, present use, serialization, part status, customer data	2	2	-	-
<i>Ensure system integration mechanism are in place</i>	3	5	-	2
PC12. support in creation of a system integration team who help integrate all the parts of the product design data	1	5	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. ensure planning and control of the entire system through status control reports, meetings reviews etc.	1	-	-	-
PC14. ensure continued system integration and validating of the data captured	1	-	-	1
<b>NOS Total</b>	<b>40</b>	<b>40</b>	<b>-</b>	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N8104
<b>NOS Name</b>	Manage the product data and system integration mechanism
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Research & Development
<b>Occupation</b>	Automotive Product Designing
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	2.0
<b>Last Reviewed On</b>	30/09/2021
<b>Next Review Date</b>	30/09/2024
<b>NSQC Approval Date</b>	30/09/2021

## ASC/N8108: Perform the component designing operation for 3D manufacturing machine.

### Description

This NOS describes the process of selecting the 3D printing machine and uploading code files into it for product generation.

### Scope

The scope covers the following :

- Generate 3D printable file from design & modeling software packages
- Generating optimum modeling curve & knowledge of curve replication by machine drivers
- Generate 3D printable file from design & modeling software packages

### Elements and Performance Criteria

#### *Generate 3D printable file from design & modeling software packages*

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

- PC1. converting a standard design model into standard tessellation language (.stl) file format
- PC2. selection of the encoding format for the 3D printing program file
- PC3. rectify any errors which are generated in the file creation process

#### *Generating optimum modeling curve & knowledge of curve replication by machine drivers*

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

- PC4. practical knowledge of the method of curve replication by machine drivers based on the parameters selected during CAD modeling

#### *Generate 3D printable file from design & modeling software packages*

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

- PC5. selection of the optimum orientation for the part
- PC6. effect of part orientation on printing time & the amount of material used
- PC7. selecting the slicing layer thickness & its dependencies on surface finish & machining time
- PC8. error correction of the part generation process

### Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1. relevant manufacturing standards and procedures followed in the company
- KU2. organization methodology/procedures used for automotive product design
- KU3. all the symbols and notifications being displayed by the 3D Printing machine and their corresponding meaning
- KU4. functionality of different buttons and switches available on the machine dashboard
- KU5. how to upload and remove code files from the machine memory
- KU6. types of 3D Printing techniques

**KU7.** recommended process for cleaning machine

**KU8.** types of files such as .stl, code file, etc generated in the various steps of the process

**KU9.** techniques of fabricating a component with 3D Printing

## **Generic Skills (GS)**

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

**GS1.** read equipment manuals and process documents

**GS2.** attentively listen and comprehend the information given by the process managers

**GS3.** communicate effectively at the workplace

**GS4.** write observations and any work related information in English/regional language

**GS5.** recognise a workplace problem and take suitable action

**GS6.** analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

**GS7.** complete assigned tasks in a timely and efficient manner

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Generate 3D printable file from design &amp; modeling software packages</i>	19	18	-	8
PC1. converting a standard design model into standard tessellation language (.stl) file format	7	7	-	3
PC2. selection of the encoding format for the 3D printing program file	7	6	-	3
PC3. rectify any errors which are generated in the file creation process	5	5	-	2
<i>Generating optimum modeling curve &amp; knowledge of curve replication by machine drivers</i>	5	5	-	5
PC4. practical knowledge of the method of curve replication by machine drivers based on the parameters selected during CAD modeling	5	5	-	5
<i>Generate 3D printable file from design &amp; modeling software packages</i>	16	17	-	7
PC5. selection of the optimum orientation for the part	5	5	-	3
PC6. effect of part orientation on printing time & the amount of material used	5	4	-	1
PC7. selecting the slicing layer thickness & its dependencies on surface finish & machining time	5	4	-	1
PC8. error correction of the part generation process	1	4	-	2
<b>NOS Total</b>	<b>40</b>	<b>40</b>	<b>-</b>	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N8108
<b>NOS Name</b>	Perform the component designing operation for 3D manufacturing machine.
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Research & Development
<b>Occupation</b>	Automotive Product Designing
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed On</b>	30/09/2021
<b>Next Review Date</b>	30/09/2024
<b>NSQC Approval Date</b>	30/09/2021



## ASC/N6811: Select and operate 3D Printing machine for product generation

### Description

This NOS describes the process of selecting the 3D printing machine for product generation and performing the postprocessing of the fabricated product.

### Scope

The scope covers the following :

- Select 3D Printing machine
- Select and upload code files into system memory
- Pre-processing settings of the machine
- Operate and perform post-printing operations
- Inspection & storage of parts

### Elements and Performance Criteria

#### *Select 3D Printing machine*

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

- PC1. identify the 3D Printing technology such as Fused Deposition Modelling, StereoLithography etc.
- PC2. identify and select the raw material to print the automotive components as per product specifications
- PC3. determine the part orientation and support structure requirement from Computer Aided Design (CAD) data
- PC4. determine the machine specifications such as build speed, extrusion speed, nozzle temperature required as per process application
- PC5. determine the parameters such as room temperature range, air cleanliness for operating the machine
- PC6. select the suitable 3D printing machine as per defined parameters

#### *Select and upload code files into system memory*

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

- PC7. select the standard tessellation language (.stl) code file needed for machine operation
- PC8. delete unwanted code files & upload new code files into the machine memory
- PC9. select any pre-stored program from machine memory
- PC10. connect the data storage devices with the machine
- PC11. check the number of automotive parts to be manufactured for each design file
- PC12. coordinate with designer to rectify any errors which are generated in the file uploading process or error observed during the running of process

#### *Pre-processing settings of machine*

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

- PC13. perform daily check of machine's critical components

- PC14. perform the pre-setting of 3D printing machine before the start of operation
- PC15. prepare the machine for operation by cleaning it as per the recommended process
- PC16. calculate the volume of material needed to generate the part as per the code provided
- PC17. load adequate consumable material into the machine for non-stop working of the machine
- PC18. pre-heat the bed of the machine to adequate temperature as per process specifications
- PC19. set the laser or nozzles temperature to defined values as per process specification

#### *Operate and perform post-printing operations*

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

- PC20. operate the machine, identify and rectify process errors if any
- PC21. use emergency stop button in case of any unwanted situation
- PC22. remove the part from machine without damaging its structure.
- PC23. identify & carefully remove the support structures present in the fabricated part
- PC24. clean the part for improving the surface finish

#### *Inspection & storage of parts produced*

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

- PC25. inspect the part as per the drawing/process and if non-conforming, take action for rework or rejection
- PC26. store & preserve the automotive parts manufactured

### **Knowledge and Understanding (KU)**

The individual on the job needs to know and understand:

- KU1. relevant manufacturing standards and procedures followed in the company
- KU2. organization methodology/procedures used for automotive product design
- KU3. all the symbols and notifications being displayed by the 3D Printing machine and their corresponding meaning
- KU4. functionality of different buttons and switches available on the machine dashboard
- KU5. how to upload and remove code files from the machine memory
- KU6. preservation of critical electronic parts/equipments from moisture/heat/environmental external conditions as specified in the process
- KU7. how to maintain the log book for produced parts
- KU8. error detection and rectification at various stages of part generation
- KU9. types of 3D Printing techniques
- KU10. recommended process for cleaning machine
- KU11. post-processing techniques
- KU12. types of materials available for fabrication in various 3D printing technique
- KU13. various inspection methods for inspecting the quality of product
- KU14. optimum temperature range, air cleanliness and humidity required for the machine
- KU15. types of files such as .stl, code file, etc generated in the various steps of the process
- KU16. techniques of fabricating a component with 3D Printing

### **Generic Skills (GS)**

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

- GS1. read equipment manuals and process documents
- GS2. attentively listen and comprehend the information given by the process managers
- GS3. communicate effectively at the workplace
- GS4. write observations and any work related information in English/regional language
- GS5. recognise a workplace problem and take suitable action
- GS6. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
- GS7. complete assigned tasks in a timely and efficient manner

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Select 3D Printing machine</i>	6	2	-	2
PC1. identify the 3D Printing technology such as Fused Deposition Modelling, StereoLithography etc.	1	1	-	1
PC2. identify and select the raw material to print the automotive components as per product specifications	1	1	-	1
PC3. determine the part orientation and support structure requirement from Computer Aided Design (CAD) data	1	-	-	-
PC4. determine the machine specifications such as build speed, extrusion speed, nozzle temperature required as per process application	1	-	-	-
PC5. determine the parameters such as room temperature range, air cleanliness for operating the machine	1	-	-	-
PC6. select the suitable 3D printing machine as per defined parameters	1	-	-	-
<i>Select and upload code files into system memory</i>	6	11	-	4
PC7. select the standard tessellation language (.stl) code file needed for machine operation	1	2	-	1
PC8. delete unwanted code files & upload new code files into the machine memory	1	3	-	1
PC9. select any pre-stored program from machine memory	1	2	-	1
PC10. connect the data storage devices with the machine	1	2	-	-
PC11. check the number of automotive parts to be manufactured for each design file	2	-	-	-
PC12. coordinate with designer to rectify any errors which are generated in the file uploading process or error observed during the running of process	-	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Pre-processing settings of machine</i>	16	14	-	7
PC13. perform daily check of machine's critical components	-	2	-	-
PC14. perform the pre-setting of 3D printing machine before the start of operation	2	2	-	1
PC15. prepare the machine for operation by cleaning it as per the recommended process	2	2	-	1
PC16. calculate the volume of material needed to generate the part as per the code provided	8	-	-	2
PC17. load adequate consumable material into the machine for non-stop working of the machine	2	4	-	1
PC18. pre-heat the bed of the machine to adequate temperature as per process specifications	2	2	-	1
PC19. set the laser or nozzles temperature to defined values as per process specification	-	2	-	1
<i>Operate and perform post-printing operations</i>	8	11	-	4
PC20. operate the machine, identify and rectify process errors if any	-	2	-	1
PC21. use emergency stop button in case of any unwanted situation	-	2	-	1
PC22. remove the part from machine without damaging its structure.	4	3	-	1
PC23. identify & carefully remove the support structures present in the fabricated part	2	2	-	-
PC24. clean the part for improving the surface finish	2	2	-	1
<i>Inspection &amp; storage of parts produced</i>	4	2	-	3
PC25. inspect the part as per the drawing/process and if non-conforming, take action for rework or rejection	2	1	-	2
PC26. store & preserve the automotive parts manufactured	2	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	40	40	-	20

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N6811
<b>NOS Name</b>	Select and operate 3D Printing machine for product generation
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Plant and Equipment Maintenance
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed On</b>	30/09/2021
<b>Next Review Date</b>	30/09/2024
<b>NSQC Approval Date</b>	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) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
6. In case of unsuccessful completion, the trainee may seek reassessment on the 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	15
ASC/N9813.Manage work and resources	50	30	-	20	100	10
ASC/N8102.Explaining the product requirements, support the manager in finalizing the design specifications and reliability parameters of the product	40	40	-	20	100	15
ASC/N8103.Design vehicles & components using computer aided technology	40	40	-	20	100	15
ASC/N8104.Manage the product data and system integration mechanism	40	40	-	20	100	15
ASC/N8108.Perform the component designing operation for 3D manufacturing machine.	40	40	-	20	100	15
ASC/N6811.Select and operate 3D Printing machine for product generation	40	40	-	20	100	15
<b>Total</b>	<b>300</b>	<b>260</b>	<b>-</b>	<b>140</b>	<b>700</b>	<b>100</b>

## Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
CFT	Complement Fixation Test
CFT	Complement Fixation Test

## Glossary

<b>Sector</b>	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.
<b>Sub-sector</b>	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
<b>Occupation</b>	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
<b>Job role</b>	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
<b>Occupational Standards (OS)</b>	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.
<b>Performance Criteria (PC)</b>	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
<b>National Occupational Standards (NOS)</b>	NOS are occupational standards which apply uniquely in the Indian context.
<b>Qualifications Pack (QP)</b>	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.
<b>Unit Code</b>	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
<b>Unit Title</b>	Unit title gives a clear overall statement about what the incumbent should be able to do.
<b>Description</b>	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.
<b>Scope</b>	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.
<b>Knowledge and Understanding (KU)</b>	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.

<b>Organisational Context</b>	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.
<b>Technical Knowledge</b>	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
<b>Core Skills/ Generic Skills (GS)</b>	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.
<b>Electives</b>	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.
<b>Options</b>	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.