



# Automotive Additive Manufacturing Engineer

QP Code: ASC/Q6414

Version: 2.0

NSQF Level: 5.5

Automotive Skills Development Council || 153, GF, Okhla Industrial Area, Phase 3  
New Delhi 110020 || email:garima@asdc.org.in

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## ASC/Q6414: Automotive Additive Manufacturing Engineer

### Brief Job Description

The individual at this job is responsible for finalizing product specifications, designing of automotive component, jigs & fixtures and development of product prototype as per the requirements fixed by R&D team.

### Personal Attributes

The person should be result oriented with good technical and analytical skills, should have Excellent Interpersonal Skills, communication and presentation skills and a good team player. They should have ability to manage projects, prioritizing of work and mentoring the budding engineers.

### Applicable National Occupational Standards (NOS)

#### Compulsory NOS:

1. [ASC/N9810: Manage work and resources \(Manufacturing\)](#)
2. [ASC/N6435: Prepare for product designing](#)
3. [ASC/N6436: Design automotive component, jigs & fixtures using CAD Software](#)
4. [ASC/N6437: Develop product prototype by 3D printing](#)
5. [DGT/VSQ/N0103: Employability Skills \(90 Hours\)](#)

### Qualification Pack (QP) Parameters

<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>Country</b>	India
<b>NSQF Level</b>	5.5
<b>Credits</b>	21
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/NIL

<b>Minimum Educational Qualification &amp; Experience</b>	12th Class with 3 Years of experience of relevant experience OR Completed 3 year diploma after 10th with 2 Years of experience of relevant experience OR B.E./B.Tech (3rd Year Pursuing ) OR Certificate-NSQF (Automotive Prototype Manufacturing Lead Technician Level 4.5) with 2 Years of experience
<b>Minimum Level of Education for Training in School</b>	
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	22 Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	NA
<b>NSQC Approval Date</b>	
<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>	<b>20</b>	<b>13</b>	-	<b>8</b>
<b>PC1.</b> identify hazardous activities and the possible causes of risks or accidents in the workplace	4	2	-	2
<b>PC2.</b> implement safe working practices for dealing with hazards to ensure safety of self and others	3	1	-	2
<b>PC3.</b> conduct regular checks of the machines with support of the maintenance team to identify potential hazards	2	2	-	1
<b>PC4.</b> 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
<b>PC5.</b> organise safety drills or training sessions to create awareness amongst others on the identified risks and safety practices	2	-	-	-
<b>PC6.</b> fill daily check sheet to report improvements done and risks identified	2	2	-	-
<b>PC7.</b> ensure that relevant safety boards/signs are placed on the shop floor for the safety of self and others	2	2	-	1
<b>PC8.</b> 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>	<b>13</b>	<b>7</b>	-	<b>5</b>
<b>PC9.</b> ensure workplace, equipment, restrooms etc. are sanitized regularly	3	2	-	1
<b>PC10.</b> ensure team is aware about hygiene and sanitation regulations and following them on the shop floor	2	1	-	-
<b>PC11.</b> ensure availability of running water, hand wash and alcohol-based sanitizers at the workplace	2	2	-	1
<b>PC12.</b> report advanced hygiene and sanitation issues to appropriate authority	1	1	-	1



Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC13.</b> follow stress and anxiety management techniques and support employees to cope with stress, anxiety etc	2	1	-	1
<b>PC14.</b> wear and dispose PPEs regularly and appropriately	3	-	-	1
<i>Effective waste management practices</i>	<b>6</b>	<b>4</b>	-	<b>1</b>
<b>PC15.</b> ensure recyclable, non-recyclable and hazardous wastes are segregated as per SOP	3	2	-	-
<b>PC16.</b> 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>
<b>PC17.</b> ensure malfunctioning (fumes/sparks/emission/vibration/noise) and lapse in maintenance of equipment are resolved effectively	2	2	-	1
<b>PC18.</b> prepare and analyze material and energy audit reports to decipher excessive consumption of material and water	3	2	-	1
<b>PC19.</b> identify possibilities of using renewable energy and environment friendly fuels	3	1	-	2
<b>PC20.</b> 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

<b>NOS Code</b>	ASC/N9810
<b>NOS Name</b>	Manage work and resources (Manufacturing)
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Generic
<b>Occupation</b>	Generic
<b>NSQF Level</b>	5
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	30/12/2021
<b>Next Review Date</b>	28/07/2025
<b>NSQC Clearance Date</b>	28/07/2022

## ASC/N6435: Prepare for product designing

### Description

This NOS unit is about identifying and analysing the design requirements received from R&D team, creating the product design based on that and assisting the manager in finalizing the design specifications.

### Scope

The scope covers the following :

- Identify product requirements
- Create basic product design
- Support in finalization of design specification
- Ensure reliability and validity of the product design

### Elements and Performance Criteria

#### *Identify and analyse product requirements*

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

- PC1.** obtain product requirements from the R & D Team like basic customer preferences, benchmarking data, technology parameters etc. and analyse them for creating the product design
- PC2.** analyse the type of material (including new material), technology and technique to be used in the design of the product
- PC3.** define the shape/ size/ environmental impact of the design
- PC4.** discuss the product requirements with team and supervisor and create a picture/image of the design

#### *Create basic product design*

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

- PC5.** create a freehand sketch/silhouette of product on the basis of image of the product design
- PC6.** ensure that all aspects of aesthetic appeal, ergonomics etc. are considered while creating the product design
- PC7.** select the procedure that displays design hierarchy
- PC8.** use mechanical CAD (Computer Aided Design) system to generate design geometry
- PC9.** generate the drafting sheets of the product (Jigs & Fixtures, Automotive components) with 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:

- PC10.** support the manager in creation of design input and requirements for each of the aggregates, 3D model of the product, etc.
- PC11.** support the manager in defining elements related to color design (interior and exterior) through analysis of a range of data including what colors are in vogue in the fields of fashion and interior design around the world
- PC12.** support in achieving the required specification of the product and ensure conformance between design output and design input

- PC13.** support in deciding the means for providing design input and demonstration of product to ensure 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 related to the development of product prototype and cost involved with the support of manager

*Ensure reliability and validity of the product design*

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

- PC16.** define reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc. in coordination with the manager
- PC17.** identify key reliability risk items and corresponding risk reduction strategy with the help of the product design manager
- PC18.** estimate the products design reliability and analyse it by using simulation models, prior warranty and tests data from similar models
- PC19.** analyse failure risks and and mechanics of the product design
- PC20.** 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

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

The individual on the job needs to know and understand:

- KU1.** relevant standards and procedures followed in the company
- KU2.** company manufacturing processes & the equipment in use
- KU3.** sequence of operations for each process
- KU4.** procedure that displays design hierarchy
- KU5.** type of automotive systems being used for the process
- KU6.** latest technologies and regulations in auto industry
- KU7.** QMS requirements
- KU8.** various specifications and parameters required to be finalized for design of the product
- KU9.** various requirements in terms of design and utility of the component
- KU10.** process flow of designing the vehicle and its components
- KU11.** use of simulation tools such as CAD, CAM etc.
- KU12.** Draughting Standards & Techniques- e.g. ANSI series IS/ ISO
- KU13.** how to conduct the failure analysis
- KU14.** impact of each cause of failure on vehicle
- KU15.** Draughting Standards & Techniques- e.g. ANSI series IS/ ISO
- KU16.** documents and records need to be maintained
- 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:

- GS1.** follow instructions, guidelines, procedures, rules, and service level agreements
- GS2.** listen effectively and communicate information accurately
- GS3.** listen effectively and communicate information accurately
- GS4.** make decisions on suitable courses
- GS5.** plan and organize the work to achieve targets and meet deadlines
- GS6.** apply problem-solving approaches to different situations
- GS7.** analyse the business impact and disseminate relevant information to others
- GS8.** apply balanced judgments to different situations
- GS9.** check the work is complete and free from errors

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Identify and analyse product requirements</i>	<b>9</b>	<b>10</b>	-	<b>4</b>
<b>PC1.</b> obtain product requirements from the R & D Team like basic customer preferences, benchmarking data, technology parameters etc. and analyse them for creating the product design	3	3	-	1
<b>PC2.</b> analyse the type of material (including new material), technology and technique to be used in the design of the product	2	3	-	1
<b>PC3.</b> define the shape/ size/ environmental impact of the design	2	2	-	1
<b>PC4.</b> discuss the product requirements with team and supervisor and create a picture/image of the design	2	2	-	1
<i>Create basic product design</i>	<b>11</b>	<b>11</b>	-	<b>5</b>
<b>PC5.</b> create a freehand sketch/silhouette of product on the basis of image of the product design	2	2	-	1
<b>PC6.</b> ensure that all aspects of aesthetic appeal, ergonomics etc. are considered while creating the product design	2	3	-	1
<b>PC7.</b> select the procedure that displays design hierarchy	2	2	-	1
<b>PC8.</b> use mechanical CAD (Computer Aided Design) system to generate design geometry	3	2	-	1
<b>PC9.</b> generate the drafting sheets of the product (Jigs & Fixtures, Automotive components) with its technical and structural constituents on the basis of the initial sketches	2	2	-	1
<i>Support in finalization of design specifications</i>	<b>9</b>	<b>10</b>	-	<b>5</b>
<b>PC10.</b> support the manager in creation of design input and requirements for each of the aggregates, 3D model of the product, etc.	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC11.</b> support the manager in defining elements related to color design (interior and exterior) through analysis of a range of data including what colors are in vogue in the fields of fashion and interior design around the world	2	1	-	1
<b>PC12.</b> support in achieving the required specification of the product and ensure conformance between design output and design input	1	1	-	-
<b>PC13.</b> support in deciding the means for providing design input and demonstration of product to ensure each requirement has been met	2	2	-	1
<b>PC14.</b> support in creating a mechanism for capturing design output	1	2	-	1
<b>PC15.</b> develop a Quality Cost Delivery analysis for all decision metrics related to the development of product prototype and cost involved with the support of manager	2	2	-	1
<i>Ensure reliability and validity of the product design</i>	<b>11</b>	<b>9</b>	-	<b>6</b>
<b>PC16.</b> define reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc. in coordination with the manager	2	2	-	1
<b>PC17.</b> identify key reliability risk items and corresponding risk reduction strategy with the help of the product design manager	2	1	-	1
<b>PC18.</b> estimate the products design reliability and analyse it by using simulation models, prior warranty and tests data from similar models	2	2	-	1
<b>PC19.</b> analyse failure risks and and mechanics of the product design	3	2	-	1
<b>PC20.</b> use the design of experiments methodology to identify factors significant to the life of the vehicle	1	1	-	1
<b>PC21.</b> use Life Data Analysis (LDA) techniques to statistically estimate the reliability of the product design and calculate various reliability-related metrics	1	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<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/N6435
<b>NOS Name</b>	Prepare for product designing
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	28/07/2025
<b>NSQC Clearance Date</b>	28/07/2022

## ASC/N6436: Design automotive component, jigs & fixtures using CAD Software

### Description

This NOS unit is about designing of automotive components, jigs & fixtures of product by using 2D and 3D design software tools and converting the design into Stereolithography format.

### Scope

The scope covers the following :

- Prepare for product designing
- Design the object model using CAD Software
- Convert the design into 3D printer supporting format(Stereolithography)

### Elements and Performance Criteria

#### *Prepare for product designing*

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

- PC1.** identify the customer requirements and work to be done by interpreting the work order, process manuals and instructions from internal design team and supervisor
- PC2.** identify and select most suitable Computer Aided Design Software like catia, NX , Fusion 360 etc. for creating the designs and models as per design requirement
- PC3.** identify the type of 3D scanner and scanned files
- PC4.** interpret the product design and collate the design requirements in terms of material used for making the component, packaging and other requirements to decide the dimensions, measurements and tolerances of the aggregate/component
- PC5.** refer any issues related to design concept clarity, dimensions and practicality to competent internal specialist or supervisor if they cannot be resolved by own

#### *Design the object model using CAD Software*

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

- PC6.** create an object model as per drawing/dimension by using selected CAD software
- PC7.** identify and optimize the Scanned files with using 3D modelling software
- PC8.** develop and design specifications of the component by using the Geometric and Trigonometric rules/ formula provided by the supervisor
- PC9.** set the required unit and dimension parameters and insert sketches, scanned images, diagrams, signs or symbols, etc. of required product design in the software
- PC10.** create a 3D model of product by using CAD techniques as per the information received from the customer
- PC11.** use the software features like tools modeling, sculpting, generative design, simulation, assemblies, collaboration, tool validation and design options like free form, solid, and mesh modeling for creating the object model as per the information received
- PC12.** verify the object model by comparing it with the information and specifications mentioned in the product modelling document

#### *Convert the design into 3D Printer supporting format*

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

- PC13.** convert the object model into STL or AMF file format as per the 3D printer requirement
- PC14.** check object model files for common errors such as holes, self-intersections, manifold errors, faces etc. and rectify the same by following organizational recommended procedures
- PC15.** transfer the verified object model STL / AMF file into portable storage device or directly to 3D printer as per SOP/WI

## **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.** how to read and interpret sketches and engineering drawings
- KU4.** different types of designing processes and associated software like CATIA, AutoCAD, Unigraphics etc.
- KU5.** draughting standards & techniques- e.g. ANSI series IS/ISO
- KU6.** technical drawing practices as per the company standards
- KU7.** drawings and modelling techniques like 2D and 3D
- KU8.** methods of using instruments like Vernier callipers, Micrometres, rulers and other inspection tools
- KU9.** use of advance measuring instrument like CMM , RMM etc.
- KU10.** function of different Computer aided design Software tools
- KU11.** algebra and trigonometric rules and applications
- KU12.** how to identify and correct errors in the object model file

## **Generic Skills (GS)**

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

- GS1.** follow instructions, guidelines, procedures, rules, and service level agreements
- GS2.** listen effectively and communicate information accurately
- GS3.** follow rule-based decision-making processes
- GS4.** make decisions on suitable courses
- GS5.** plan and organize the work to achieve targets and meet deadlines
- GS6.** apply problem-solving approaches to different situations
- GS7.** analyse the business impact and disseminate relevant information to others
- GS8.** apply balanced judgments to different situations
- GS9.** check the work is complete and free from errors

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for product designing</i>	<b>14</b>	<b>12</b>	-	<b>7</b>
<b>PC1.</b> identify the customer requirements and work to be done by interpreting the work order, process manuals and instructions from internal design team and supervisor	3	3	-	2
<b>PC2.</b> identify and select most suitable Computer Aided Design Software like catia, NX , Fusion 360 etc. for creating the designs and models as per design requirement	3	2	-	1
<b>PC3.</b> identify the type of 3D scanner and scanned files	2	3	-	1
<b>PC4.</b> interpret the product design and collate the design requirements in terms of material used for making the component, packaging and other requirements to decide the dimensions, measurements and tolerances of the aggregate/component	3	2	-	1
<b>PC5.</b> refer any issues related to design concept clarity, dimensions and practicality to competent internal specialist or supervisor if they cannot be resolved by own	3	2	-	2
<i>Design the object model using CAD Software</i>	<b>19</b>	<b>19</b>	-	<b>8</b>
<b>PC6.</b> create an object model as per drawing/dimension by using selected CAD software	3	3	-	2
<b>PC7.</b> identify and optimize the Scanned files with using 3D modelling software	2	3	-	1
<b>PC8.</b> develop and design specifications of the component by using the Geometric and Trigonometric rules/ formula provided by the supervisor	2	3	-	1
<b>PC9.</b> set the required unit and dimension parameters and insert sketches, scanned images, diagrams, signs or symbols, etc. of required product design in the software	3	3	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> create a 3D model of product by using CAD techniques as per the information received from the customer	3	2	-	1
<b>PC11.</b> use the software features like tools modeling, sculpting, generative design, simulation, assemblies, collaboration, tool validation and design options like free form, solid, and mesh modeling for creating the object model as per the information received	3	2	-	1
<b>PC12.</b> verify the object model by comparing it with the information and specifications mentioned in the product modelling document	3	3	-	1
<i>Convert the design into 3D Printer supporting format</i>	<b>7</b>	<b>9</b>	-	<b>5</b>
<b>PC13.</b> convert the object model into STL or AMF file format as per the 3D printer requirement	2	3	-	1
<b>PC14.</b> check object model files for common errors such as holes, self-intersections, manifold errors, faces etc. and rectify the same by following organizational recommended procedures	3	3	-	2
<b>PC15.</b> transfer the verified object model STL / AMF file into portable storage device or directly to 3D printer as per SOP/WI	2	3	-	2
<b>NOS Total</b>	<b>40</b>	<b>40</b>	-	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N6436
<b>NOS Name</b>	Design automotive component, jigs & fixtures using CAD Software
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	28/07/2025
<b>NSQC Clearance Date</b>	28/07/2022

## **ASC/N6437: Develop product prototype by 3D printing**

### **Description**

This unit is about developing a prototype of product by using 3D printing machines and performing the post process of the fabricated product as per standards drafting sheets of the organization.

### **Scope**

The scope covers the following :

- Prepare 3D printable file from design & modeling software packages
- Generate 3D printable file from design & modeling software packages
- Monitor post-printing activities
- Support in maintenance of 3D printing and allied machinery

### **Elements and Performance Criteria**

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

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

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

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

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

- PC4.** select the standard tessellation language (.stl) code file needed for machine operation
- PC5.** connect the data storage devices with the machine
- PC6.** select the optimum orientation for the part
- PC7.** set the part orientation, printing time & the amount of material used on the machine
- PC8.** set the slicing layer thickness & its dependencies on surface finish & machining time
- PC9.** support the 3D printing machine operator during 3D printing operation and monitor the 3D printing process
- PC10.** coordinate with designer to rectify any errors which are generated during the file uploading process or errors observed during the 3D printing process

#### *Monitor post-printing activities*

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

- PC11.** ensure that operator is removing the printed part from machine safely and without any damage to its structure
- PC12.** ensure that operator is removing the support structures present in the fabricated part
- PC13.** check that printed part is cleaned after printing process for improving the surface finish as per SOP
- PC14.** ensure that all the tools, equipment and auxiliaries are cleaned and stored after completion of work as per the guidelines
- PC15.** inspect that part is as per the drawing and required quality and if non-conforming, take action as per organizational guidelines

**PC16.** find out the measurement errors between 3D printed files and drafted files provided

**PC17.** carryout the optimization process of the product to rectify the difference

**PC18.** store & preserve the automotive parts manufactured as per organizational guidelines and procedures

*Support in maintenance of 3D printing and allied machinery*

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

**PC19.** prepare the maintenance plan and checklist as per machinery requirement

**PC20.** support the operators in performing minor repairs, adjustments and alignment of loose bolts, belts, drive slacks, guards and covers of the machine

**PC21.** ensure that repaired 3D printing machine is working properly and running smoothly

**PC22.** maintain records of maintenance activities done on machine as per organizational procedure

## **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 product design

**KU3.** all the symbols and notifications being displayed by the 3D Printing machine and their corresponding meaning

**KU4.** technology 3D Printing such as Fused Deposition Modelling, Stereo Lithography, Metal Laser Sintering

**KU5.** types of files such as .stl, code file, etc generated in the various steps of the process

**KU6.** techniques of fabricating a component with 3D Printing

**KU7.** how to upload and remove code files from the machine memory

**KU8.** types of 3D Printing techniques

**KU9.** types of materials available for fabrication in various 3D printing technique

**KU10.** post-processing techniques

**KU11.** how to detect and rectify error at various stages of part generation

**KU12.** various inspection methods for inspecting the quality of product such as CMM, RMM and 3D Measurement machine.

## **Generic Skills (GS)**

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

**GS1.** follow instructions, guidelines, procedures, rules, and service level agreements

**GS2.** listen effectively and communicate information accurately

**GS3.** follow rule-based decision-making processes

**GS4.** make decisions on suitable courses

**GS5.** plan and organize the work to achieve targets and meet deadlines

**GS6.** apply problem-solving approaches to different situations

**GS7.** analyse the business impact and disseminate relevant information to others

**GS8.** apply balanced judgments to different situations



**GS9.** check the work is complete and free from errors

## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare 3D printable file from design &amp; modeling software packages</i>	<b>6</b>	<b>7</b>	-	<b>4</b>
<b>PC1.</b> convert a standard design model into standard tessellation language (.stl) file format	2	2	-	1
<b>PC2.</b> select encoding format for the 3D printing program file	2	2	-	2
<b>PC3.</b> rectify any errors which are generated in the file creation process	2	3	-	1
<i>Generate 3D printable file from design &amp; modeling software packages</i>	<b>12</b>	<b>12</b>	-	<b>6</b>
<b>PC4.</b> select the standard tessellation language (.stl) code file needed for machine operation	2	2	-	1
<b>PC5.</b> connect the data storage devices with the machine	1	1	-	-
<b>PC6.</b> select the optimum orientation for the part	1	1	-	1
<b>PC7.</b> set the part orientation, printing time & the amount of material used on the machine	2	2	-	1
<b>PC8.</b> set the slicing layer thickness & its dependencies on surface finish & machining time	2	2	-	1
<b>PC9.</b> support the 3D printing machine operator during 3D printing operation and monitor the 3D printing process	2	2	-	1
<b>PC10.</b> coordinate with designer to rectify any errors which are generated during the file uploading process or errors observed during the 3D printing process	2	2	-	1
<i>Monitor post-printing activities</i>	<b>14</b>	<b>14</b>	-	<b>6</b>
<b>PC11.</b> ensure that operator is removing the printed part from machine safely and without any damage to its structure	2	2	-	1
<b>PC12.</b> ensure that operator is removing the support structures present in the fabricated part	2	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC13.</b> check that printed part is cleaned after printing process for improving the surface finish as per SOP	2	2	-	1
<b>PC14.</b> ensure that all the tools, equipment and auxiliaries are cleaned and stored after completion of work as per the guidelines	2	2	-	1
<b>PC15.</b> inspect that part is as per the drawing and required quality and if non-conforming, take action as per organizational guidelines	2	2	-	1
<b>PC16.</b> find out the measurement errors between 3D printed files and drafted files provided	2	1	-	-
<b>PC17.</b> carryout the optimization process of the product to rectify the difference	1	2	-	1
<b>PC18.</b> store & preserve the automotive parts manufactured as per organizational guidelines and procedures	1	1	-	-
<i>Support in maintenance of 3D printing and allied machinery</i>	<b>8</b>	<b>7</b>	-	<b>4</b>
<b>PC19.</b> prepare the maintenance plan and checklist as per machinery requirement	2	2	-	1
<b>PC20.</b> support the operators in performing minor repairs, adjustments and alignment of loose bolts, belts, drive slacks, guards and covers of the machine	2	2	-	1
<b>PC21.</b> ensure that repaired 3D printing machine is working properly and running smoothly	2	2	-	1
<b>PC22.</b> maintain records of maintenance activities done on machine as per organizational procedure	2	1	-	1
<b>NOS Total</b>	<b>40</b>	<b>40</b>	-	<b>20</b>

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	ASC/N6437
<b>NOS Name</b>	Develop product prototype by 3D printing
<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>NSQF Level</b>	6
<b>Credits</b>	TBD
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	NA
<b>Next Review Date</b>	28/07/2025
<b>NSQC Clearance Date</b>	28/07/2022

## **DGT/VSQ/N0103: Employability Skills (90 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.** understand the significance of employability skills in meeting the current job market requirement and future of work
- PC2.** identify and explore learning and employability relevant portals
- PC3.** research about the different industries, job market trends, latest skills required and the available opportunities

#### *Constitutional values - Citizenship*

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

- PC4.** 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.
- PC5.** follow environmentally sustainable practices

#### *Becoming a Professional in the 21st Century*

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

- PC6.** recognize the significance of 21st Century Skills for employment
- PC7.** 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

**PC8.** adopt a continuous learning mindset for personal and professional development

*Basic English Skills*

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

**PC9.** use basic English for everyday conversation in different contexts, in person and over the telephone

**PC10.** read and understand routine information, notes, instructions, mails, letters etc. written in English

**PC11.** 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:

**PC12.** identify career goals based on the skills, interests, knowledge, and personal attributes

**PC13.** prepare a career development plan with short- and long-term goals

*Communication Skills*

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

**PC14.** follow verbal and non-verbal communication etiquette while communicating in professional and public settings

**PC15.** use active listening techniques for effective communication

**PC16.** communicate in writing using appropriate style and format based on formal or informal requirements

**PC17.** work collaboratively with others in a team

*Diversity & Inclusion*

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

**PC18.** communicate and behave appropriately with all genders and PwD

**PC19.** 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:

**PC20.** identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.

**PC21.** carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook

**PC22.** identify common components of salary and compute income, expenses, taxes, investments etc

**PC23.** 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:

**PC24.** operate digital devices and use their features and applications securely and safely

**PC25.** carry out basic internet operations by connecting to the internet safely and securely, using the mobile data or other available networks through Bluetooth, Wi-Fi, etc.

**PC26.** display responsible online behaviour while using various social media platforms

**PC27.** create a personal email account, send and process received messages as per requirement

**PC28.** carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications

**PC29.** utilize virtual collaboration tools to work effectively

### *Entrepreneurship*

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

- PC30.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC31.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC32.** 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:

- PC33.** identify different types of customers and ways to communicate with them
- PC34.** identify and respond to customer requests and needs in a professional manner
- PC35.** use appropriate tools to collect customer feedback
- PC36.** follow appropriate hygiene and grooming standards

### *Getting ready for apprenticeship & Jobs*

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

- PC37.** create a professional Curriculum vitae (Résumé)
- PC38.** search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively
- PC39.** apply to identified job openings using offline /online methods as per requirement
- PC40.** answer questions politely, with clarity and confidence, during recruitment and selection
- PC41.** 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.** components of salary and 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

- KU16.** use applications such as word processors, spreadsheets etc.
- KU17.** how to identify business opportunities
- KU18.** types and needs of customers
- KU19.** how to apply for a job and prepare for an interview
- KU20.** 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 in English and other languages
- GS2.** communicate effectively using appropriate language in formal and informal settings
- GS3.** behave politely and appropriately with all to maintain effective work relationship
- GS4.** how to work in a virtual mode, using various technological platforms
- 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



## Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	<b>1</b>	<b>1</b>	-	-
<b>PC1.</b> understand the significance of employability skills in meeting the current job market requirement and future of work	-	-	-	-
<b>PC2.</b> identify and explore learning and employability relevant portals	-	-	-	-
<b>PC3.</b> research about the different industries, job market trends, latest skills required and the available opportunities	-	-	-	-
<i>Constitutional values – Citizenship</i>	<b>1</b>	<b>1</b>	-	-
<b>PC4.</b> 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.	-	-	-	-
<b>PC5.</b> follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	<b>1</b>	<b>3</b>	-	-
<b>PC6.</b> recognize the significance of 21st Century Skills for employment	-	-	-	-
<b>PC7.</b> 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	-	-	-	-
<b>PC8.</b> adopt a continuous learning mindset for personal and professional development	-	-	-	-
<i>Basic English Skills</i>	<b>3</b>	<b>4</b>	-	-
<b>PC9.</b> use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC10.</b> read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
<b>PC11.</b> write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development &amp; Goal Setting</i>	<b>1</b>	<b>2</b>	-	-
<b>PC12.</b> identify career goals based on the skills, interests, knowledge, and personal attributes	-	-	-	-
<b>PC13.</b> prepare a career development plan with short- and long-term goals	-	-	-	-
<i>Communication Skills</i>	<b>2</b>	<b>2</b>	-	-
<b>PC14.</b> follow verbal and non-verbal communication etiquette while communicating in professional and public settings	-	-	-	-
<b>PC15.</b> use active listening techniques for effective communication	-	-	-	-
<b>PC16.</b> communicate in writing using appropriate style and format based on formal or informal requirements	-	-	-	-
<b>PC17.</b> work collaboratively with others in a team	-	-	-	-
<i>Diversity &amp; Inclusion</i>	<b>1</b>	<b>1</b>	-	-
<b>PC18.</b> communicate and behave appropriately with all genders and PwD	-	-	-	-
<b>PC19.</b> escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	<b>2</b>	<b>3</b>	-	-
<b>PC20.</b> identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.	-	-	-	-
<b>PC21.</b> carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC22.</b> identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
<b>PC23.</b> identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	<b>3</b>	<b>5</b>	-	-
<b>PC24.</b> operate digital devices and use their features and applications securely and safely	-	-	-	-
<b>PC25.</b> carry out basic internet operations by connecting to the internet safely and securely, using the mobile data or other available networks through Bluetooth, Wi-Fi, etc.	-	-	-	-
<b>PC26.</b> display responsible online behaviour while using various social media platforms	-	-	-	-
<b>PC27.</b> create a personal email account, send and process received messages as per requirement	-	-	-	-
<b>PC28.</b> carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications	-	-	-	-
<b>PC29.</b> utilize virtual collaboration tools to work effectively	-	-	-	-
<i>Entrepreneurship</i>	<b>2</b>	<b>3</b>	-	-
<b>PC30.</b> identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
<b>PC31.</b> develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
<b>PC32.</b> identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	<b>1</b>	<b>2</b>	-	-
<b>PC33.</b> identify different types of customers and ways to communicate with them	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<b>PC34.</b> identify and respond to customer requests and needs in a professional manner	-	-	-	-
<b>PC35.</b> use appropriate tools to collect customer feedback	-	-	-	-
<b>PC36.</b> follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship &amp; Jobs</i>	<b>2</b>	<b>3</b>	-	-
<b>PC37.</b> create a professional Curriculum vitae (Résumé)	-	-	-	-
<b>PC38.</b> search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
<b>PC39.</b> apply to identified job openings using offline /online methods as per requirement	-	-	-	-
<b>PC40.</b> answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
<b>PC41.</b> identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
<b>NOS Total</b>	<b>20</b>	<b>30</b>	-	-

## National Occupational Standards (NOS) Parameters

<b>NOS Code</b>	DGT/VSQ/N0103
<b>NOS Name</b>	Employability Skills (90 Hours)
<b>Sector</b>	Cross Sectoral
<b>Sub-Sector</b>	Professional Skills
<b>Occupation</b>	Employability
<b>NSQF Level</b>	5
<b>Credits</b>	3
<b>Version</b>	1.0
<b>Last Reviewed Date</b>	31/08/2023
<b>Next Review Date</b>	31/08/2026
<b>NSQC Clearance Date</b>	31/08/2023

## 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

**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
ASC/N6435.Prepare for product designing	40	40	0	20	100	15
ASC/N6436.Design automotive component, jigs & fixtures using CAD Software	40	40	0	20	100	30
ASC/N6437.Develop product prototype by 3D printing	40	40	0	20	100	35
DGT/VSQ/N0103.Employability Skills (90 Hours)	20	30	-	-	50	10
<b>Total</b>	<b>190</b>	<b>180</b>	<b>-</b>	<b>80</b>	<b>450</b>	<b>100</b>

## Acronyms

<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training

## 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.