Qualification Pack

Automotive CNC Machining Technician

QP Code: ASC/Q3503

Version: 5.0

NSQF Level: 4

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Contents

ASC/Q3503: Automotive CNC Machining Technician 3
Brief Job Description 3
Applicable National Occupational Standards (NOS) 3
Compulsory NOS 3
Qualification Pack (QP) Parameters 3
ASC/N9803: Organize work and resources (Manufacturing) 5
DGT/VSQ/N0102: Employability Skills (60 Hours) 11
ASC/N9805: Interpret engineering drawing 19
ASC/N3535: Prepare for machining activities 24
ASC/N3508: Perform machining operations 28
ASC/N3509: Perform post machining and maintenance activities 34
Assessment Guidelines and Weightage 38
Assessment Guidelines 38
Assessment Weightage 39
Acronyms 40
Glossary 41

Qualification Pack

ASC/Q3503: Automotive CNC Machining Technician

Brief Job Description

The individual is primarily involved in various machining and inspection work on CNC machines such as quality verification, minor repair work, change of worn out tools, re-setting of the tools, machine programming and de-burring.

Personal Attributes

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

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ASC/N9803: Organize work and resources (Manufacturing)
2. DGT/VSQ/N0102: Employability Skills (60 Hours)
3. ASC/N9805: Interpret engineering drawing
4. ASC/N3535: Prepare for machining activities
5. ASC/N3508: Perform machining operations
6. ASC/N3509: Perform post machining and maintenance activities

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
Country	India
NSQF Level	4
Credits	NA
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7223.5002

Qualification Pack

Minimum Educational Qualification & Experience	10th Class (+1 year ITI) OR 10th Class with 2 Years of experience of relevant experience OR 11th Class OR Certificate-NSQF (Automotive Machining Operator Level 3) with 2 Years of experience of relevant experience
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	20/11/2025
NSQC Approval Date	20/11/2020
Version	5.0
Reference code on NQR	2020/AUT/ASDC/03970
NQR Version	5

ASC/N9803: Organize work and resources (Manufacturing)

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
- Health and hygiene
- Perform work as per quality standards
- 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. follow safe working practices while dealing with hazards to ensure safety of self and others

PC3. carry out routine check of the machine for identifying potential hazards

PC4. use appropriate protective clothing/equipment for specific tasks and work

PC5. follow safety hazards and preventive techniques during fire drill

PC6. report any identified breaches in health, safety and security policies and procedures to the designated person

Health and hygiene

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

PC7. ensure workstation and equipment are regularly clean and sanitized

PC8. clean hands with soap, alcohol-based sanitizer regularly

PC9. avoid contact with ill people and self-isolate in a similar situation

PC10. wear and dispose PPEs regularly and appropriately

PC11. report advanced hygiene and sanitation issues to appropriate authority

PC12. follow stress and anxiety management techniques

Perform work as per quality standards

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

PC13. ensure that work is accomplished as per the requirements within the specified timeline

PC14. ensure team goals are given preference over individual goals

Effective waste management practices

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

PC15. follow the fundamentals of 5S for waste management

PC16. segregate waste into different categories

PC17. follow processes specified for disposal of hazardous waste

PC18. identify recyclable, non-recyclable and hazardous waste

PC19. dispose non-recyclable, recyclable and reusable waste appropriately at identified location

Material/energy conservation practices

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

PC20. identify ways to optimize usage of material in various tasks/activities/processes

PC21. check for spills/leakages in various tasks/activities/processes

PC22. plug spills/leakages and escalate to appropriate authority if unable to rectify

PC23. check if the equipment/machine is functioning normally before commencing work and rectify wherever required

PC24. report malfunctioning (fumes/ sparks/emission/vibration/noise) and lapse in maintenance of equipment

PC25. ensure electrical equipment and appliances are properly connected and turned off when not in use

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. preventative and remedial actions to be taken in case of exposure to toxic material

KU7. various types of fire extinguisher

KU8. various types of safety signs and their meaning

KU9. appropriate first aid treatment relevant to different condition e.g. bleeding, minor burns, eye injuries etc.

KU10. relevant standards, procedures and policies related to 5S followed in the company

KU11. the various materials used and their storage norms

KU12. efficient utilisation of material and water

KU13. basics of electricity and prevalent energy efficient devices

KU14. common practices of conserving electricity

KU15. common sources and ways to minimize pollution

KU16. categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics

KU17. usage of different colors of dustbins

KU18. waste management techniques
KU19. 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. ask for clarifications from superior about the job requirement
GS4. work with supervisors/team members to carry out work related tasks
GS5. complete tasks efficiently and accurately within stipulated time
GS6. inform/report to concerned person in case of any problem
GS7. make timely decisions for efficient utilization of resources
GS8. write reports such as accident report, in at least English/regional language
GS9. be punctual and utilize time efficiently

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Maintain safe and secure working environment	**11**	**5**	**-**	**7**
PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace	2	1	-	2
PC2. follow safe working practices while dealing with hazards to ensure safety of self and others	2	-	-	1
PC3. carry out routine check of the machine for identifying potential hazards	2	1	-	1
PC4. use appropriate protective clothing/equipment for specific tasks and work	2	1	-	1
PC5. follow safety hazards and preventive techniques during fire drill	2	1	-	1
PC6. report any identified breaches in health, safety and security policies and procedures to the designated person	1	1	-	1
Health and hygiene	**7**	**5**	**-**	**2**
PC7. ensure workstation and equipment are regularly clean and sanitized	2	2	-	1
PC8. clean hands with soap, alcohol-based sanitizer regularly	1	1	-	1
PC9. avoid contact with ill people and self-isolate in a similar situation	1	-	-	-
PC10. wear and dispose PPEs regularly and appropriately	1	-	-	-
PC11. report advanced hygiene and sanitation issues to appropriate authority	1	1	-	-
PC12. follow stress and anxiety management techniques	1	1	-	-
Perform work as per quality standards	**5**	**3**	**-**	**2**
PC13. ensure that work is accomplished as per the requirements within the specified timeline	2	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. ensure team goals are given preference over individual goals	3	1	-	1
Effective waste management practices	**15**	**10**	**-**	**4**
PC15. follow the fundamentals of 5S for waste management	3	2	-	1
PC16. segregate waste into different categories	2	1	-	-
PC17. follow processes specified for disposal of hazardous waste	2	2	-	1
PC18. identify recyclable, non-recyclable and hazardous waste	4	2	-	1
PC19. dispose non-recyclable, recyclable and reusable waste appropriately at identified location	4	3	-	1
Material/energy conservation practices	**12**	**7**	**-**	**5**
PC20. identify ways to optimize usage of material in various tasks/activities/processes	2	1	-	1
PC21. check for spills/leakages in various tasks/activities/processes	2	1	-	1
PC22. plug spills/leakages and escalate to appropriate authority if unable to rectify	2	1	-	-
PC23. check if the equipment/machine is functioning normally before commencing work and rectify wherever required	2	2	-	1
PC24. report malfunctioning (fumes/ sparks/emission/vibration/noise) and lapse in maintenance of equipment	2	1	-	1
PC25. ensure electrical equipment and appliances are properly connected and turned off when not in use	2	1	-	1
NOS Total	**50**	**30**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9803
NOS Name	Organize work and resources (Manufacturing)
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	3
Credits	TBD
Version	1.0
Last Reviewed Date	31/03/2022
Next Review Date	24/06/2026
NSQC Clearance Date	24/06/2021

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

Description

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

Scope

The scope covers the following :

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

Elements and Performance Criteria

Introduction to Employability Skills

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

PC1. identify employability skills required for jobs in various industries

PC2. identify and explore learning and employability portals

Constitutional values – Citizenship

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

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

PC4. follow environmentally sustainable practices

Becoming a Professional in the 21st Century

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

PC5. recognize the significance of 21st Century Skills for employment

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

Basic English Skills

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

PC7. use basic English for everyday conversation in different contexts, in person and over the telephone

PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English

PC9. write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

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

PC10. understand the difference between job and career

PC11. prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

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

PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings

PC13. work collaboratively with others in a team

Diversity & Inclusion

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

PC14. communicate and behave appropriately with all genders and PwD

PC15. escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

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

PC16. select financial institutions, products and services as per requirement

PC17. carry out offline and online financial transactions, safely and securely

PC18. identify common components of salary and compute income, expenses, taxes, investments etc

PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

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

PC20. operate digital devices and carry out basic internet operations securely and safely

PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively

PC22. use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

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

PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research

PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion

PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

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

PC26. identify different types of customers

PC27. identify and respond to customer requests and needs in a professional manner.

PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC29. create a professional Curriculum vitae (Résumé)

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

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

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

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

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

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

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

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

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

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

KU11. how to compute income and expenditure

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

KU13. different legal rights and laws

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

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

KU16. how to identify business opportunities

KU17. types and needs of customers

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

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

Generic Skills (GS)

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

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

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

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

Assessment Criteria

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

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

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

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	31/08/2023
Next Review Date	31/08/2026
NSQC Clearance Date	31/08/2023

ASC/N9805: Interpret engineering drawing

Description

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

Scope

The scope covers the following :

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

Elements and Performance Criteria

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

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

PC1. interpret engineering drawing's uniqueness, dimensions and important features in 2D and 3D shapes

PC2. identify the difference between 2D and 3D shapes

PC3. explain difference between first angle projection and third angle projection in mechanical engineering drawing

PC4. interpret all the 3 axes (x, y and z axis) and geometrical shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection

PC5. identify details of the machine component which are not clearly visible by interpreting section views

Identify drawing standards and symbols

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

PC6. interpret Geometric Dimensioning and Tolerencing (GD&T) symbols in the drawings

PC7. interpret symbols of Radius, controlled radius, spherical radius, diameter, spherical diameter, square, counterbore, spotface, depth, countersink, “by”, maximum dimension, minimum dimension, reference, dimension origin etc

PC8. identify the sequence of operations which enables the selection and prioritization of the datums

PC9. read and interpret information from Tolerance Zone boundaries for part features in terms of shape and size

Modification and storage of drawing

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

PC10. observe any modification, changes required in the drawing and communicate the same to the concerned team in the organization

PC11. store the drawings in an easily accessible place, avoiding damage from moisture, chemicals and fire

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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

Generic Skills (GS)

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

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

Assessment Criteria

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

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

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9805
NOS Name	Interpret engineering drawing
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	25/11/2021
Next Review Date	24/06/2026
NSQC Clearance Date	24/06/2021

ASC/N3535: Prepare for machining activities

Description

This NOS is about preparing for machining activities either manually or through specialized techniques as per the given work order and the standards specified by the organization.

Scope

The scope covers the following :

- Identify raw material and tools requirement
- Checking the specifications of the component
- Support in programming the CNC machine

Elements and Performance Criteria

Identify raw material and tools requirement

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

PC1. identify the input and output product based on engineering drawing

PC2. identify the raw materials required for the job

PC3. select tools, jigs, fixtures and machining parameters like cutting speed, depth of cut and feed as per work instructions

Checking the specifications of the component

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

PC4. check the input component as per the required quality standard

PC5. measure and mark reference points/cutting lines on the work pieces by using compass, callipers, rulers and other measuring tools

PC6. identify required limits of machining e.g. surface finish, specific orientation, gauge inspection etc.as per organisational policy

Support in programming the CNC machine

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

PC7. support the Lead Technician in programming the CNC/numerically controlled machine as per the work instructions

PC8. take support from the supervisor/maintenance team in machine programming during the downtime

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. different types of machined products manufactured by the company

KU2. various types of machining processes such as drilling, boring, turning etc.

KU3. the importance of cycle-time and operational efficiency of process

KU4. fundamentals of CNC machines and mechanics

KU5. the impact of various machining parameters on the final product

KU6. SOP recommended by the manufacturer for using tools, jigs, fixtures, measuring instruments etc. used during the machining processes

KU7. how to interpret process charts

KU8. the use of various cutting tools for different machining operations

KU9. safety requirements for CNC machine and tools during the machining work

Generic Skills (GS)

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

GS1. read and interpret workplace related charts and drawings

GS2. communicate effectively process requirements to the lead technician and co-workers

GS3. attentively listen and comprehend the information given by the lead technician/team members

GS4. write 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. plan and organise work according to the principles of 5S

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Identify raw material and tools requirement	**14**	**22**	**-**	**7**
PC1. identify the input and output product based on engineering drawing	4	6	-	3
PC2. identify the raw materials required for the job	4	6	-	2
PC3. select tools, jigs, fixtures and machining parameters like cutting speed, depth of cut and feed as per work instructions	6	10	-	2
Checking the specifications of the component	**12**	**22**	**-**	**6**
PC4. check the input component as per the required quality standard	2	4	-	-
PC5. measure and mark reference points/cutting lines on the work pieces by using compass, callipers, rulers and other measuring tools	4	9	-	3
PC6. identify required limits of machining e.g. surface finish, specific orientation, gauge inspection etc.as per organisational policy	6	9	-	3
Support in programming the CNC machine	**4**	**6**	**-**	**7**
PC7. support the Lead Technician in programming the CNC/numerically controlled machine as per the work instructions	2	6	-	4
PC8. take support from the supervisor/maintenance team in machine programming during the downtime	2	-	-	3
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3535
NOS Name	Prepare for machining activities
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	18/08/2020
Next Review Date	20/11/2025
NSQC Clearance Date	20/11/2020

ASC/N3508: Perform machining operations

Description

This NOS is about carrying out various machining operations such as drilling, boring, reaming, turning etc. on the CNC machine

Scope

The scope covers the following :

- Setting up machine
- Perform machining on the component
- Observe and record data related to machine operations
- Perform tool change during machining operation

Elements and Performance Criteria

Setting up machine

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

PC1. set-up and adjust the machine tools, fixtures/jigs and cutting tools as per the process requirement

PC2. lift the work piece/metal stock manually or by hoist, position the same securely on the machine bed using fasteners and hand tools and verify their positions with measuring instruments if required

PC3. check the working of different holding fixtures, gears, stops etc. to prevent work piece movement using hand tools, power tools, tightening tools, torque measuring instruments etc.

PC4. follow the do's and don’ts of the manufacturing process as defined in SOPs/Work Instructions or given by supervisors

PC5. set the machine for auto cycle

PC6. check and confirm the level of lubricant and flow-rate in the storage tank as per control plan

Perform machining on the component

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

PC7. start the turning/drilling/reaming/tapping/boring for operations

PC8. ensure that the right programme is selected in the CNC machine as defined in the SOP

PC9. maintain length to bore ratio of the tool to avoid deflection of cutting tool in case of boring operations

PC10. turn on the coolant valves and start its flow to maintain temperature of work piece and tool

PC11. brush or spray lubricating material on work pieces as per requirement

PC12. take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc.

PC13. extract or lift jammed pieces from machines through use of wire hooks, lift bars, hands etc.

Observe and record data related to machine operations

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

PC14. record the non-confirming dimensions in the output and rectify the same if required

PC15. observe the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction

PC16. record the data related to the loss time in case of machine stops

PC17. maintain the record of tool offsetting and key dimensions on control charts/SPC record as per organization policies

Perform tool change during machining operation

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

PC18. ensure that the blunt tools are timely and safely replaced with new tools

PC19. replace machine part as per work instructions using hand tools or notify supervisor/engineering personnel for taking corrective actions

PC20. ensure tool changing cycle from spindle to magazine and vice versa is correctly performed

PC21. ensure that all the tools are put in the right pockets

PC22. ensure tool replacement as per recommended tool life in number of pieces

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. various types of machining processes such as drilling, boring, turning etc.

KU2. the metal properties and metallurgy

KU3. Standard Operating Procedures (SOP) recommended by the manufacturer for using tools and measuring instruments used during the machining processes

KU4. how to select right CNC machining program

KU5. SOP recommended by the manufacturer for using jigs, fixtures and material handling devices

KU6. the use of various cutting tools for different machining operations

KU7. SOP recommended by the organisation for operating CNC machine

KU8. SOP recommended by the organisation for checking irregularities in the product/work piece

KU9. safety requirements for CNC machine and tools during the machining work

Generic Skills (GS)

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

GS1. read and interpret drawings, charts and machine readings

GS2. communicate issues to the supervisor that occur during machining process

GS3. attentively listen and comprehend the information given by the lead technician/team members

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

GS5. discuss task lists and job requirements with co-workers

GS6. analyse the complexity of work to determine if it can be successfully carried out or needs to be referred to a superior/specialist

GS7. analyse information and evaluate results to choose the best solution and solve problems

GS8. plan and organize tools, machines and consumables for carrying out machining job

GS9. complete the assigned tasks with minimum supervision

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Setting up machine	**7**	**12**	**-**	**7**
PC1. set-up and adjust the machine tools, fixtures/jigs and cutting tools as per the process requirement	2	4	-	2
PC2. lift the work piece/metal stock manually or by hoist, position the same securely on the machine bed using fasteners and hand tools and verify their positions with measuring instruments if required	1	2	-	1
PC3. check the working of different holding fixtures, gears, stops etc. to prevent work piece movement using hand tools, power tools, tightening tools, torque measuring instruments etc.	1	2	-	1
PC4. follow the do's and don'ts of the manufacturing process as defined in SOPs/Work Instructions or given by supervisors	1	1	-	1
PC5. set the machine for auto cycle	-	1	-	1
PC6. check and confirm the level of lubricant and flow-rate in the storage tank as per control plan	2	2	-	1
Perform machining on the component	**17**	**21**	**-**	**8**
PC7. start the turning/drilling/reaming/tapping/boring for operations	8	12	-	6
PC8. ensure that the right programme is selected in the CNC machine as defined in the SOP	2	2	-	-
PC9. maintain length to bore ratio of the tool to avoid deflection of cutting tool in case of boring operations	2	2	-	1
PC10. turn on the coolant valves and start its flow to maintain temperature of work piece and tool	1	2	-	0.5
PC11. brush or spray lubricating material on work pieces as per requirement	-	1	-	-
PC12. take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc.	2	-	-	0.5

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. extract or lift jammed pieces from machines through use of wire hooks, lift bars, hands etc.	2	2	-	-
Observe and record data related to machine operations	**3**	**8**	**-**	**3**
PC14. record the non-confirming dimensions in the output and rectify the same if required	-	2	-	0.5
PC15. observe the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction	2	4	-	0.5
PC16. record the data related to the loss time in case of machine stops	1	-	-	1
PC17. maintain the record of tool offsetting and key dimensions on control charts/SPC record as per organization policies	-	2	-	1
Perform tool change during machining operation	**3**	**9**	**-**	**2**
PC18. ensure that the blunt tools are timely and safely replaced with new tools	1	2	-	-
PC19. replace machine part as per work instructions using hand tools or notify supervisor/engineering personnel for taking corrective actions	2	3	-	-
PC20. ensure tool changing cycle from spindle to magazine and vice versa is correctly performed	-	2	-	1
PC21. ensure that all the tools are put in the right pockets	-	1	-	1
PC22. ensure tool replacement as per recommended tool life in number of pieces	-	1	-	-
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3508
NOS Name	Perform machining operations
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
NSQF Level	4
Credits	TBD
Version	3.0
Last Reviewed Date	18/08/2020
Next Review Date	20/11/2025
NSQC Clearance Date	20/11/2020

ASC/N3509: Perform post machining and maintenance activities

Description

This NOS unit is about conducting all post machining operations such as performing minor maintenance, assisting in tool change operations, deburring and gauging activities

Scope

The scope covers the following :

- Perform de- burring activity on the machined components
- Check quality of machined component (Gauging)
- Perform machine maintenance activities

Elements and Performance Criteria

Perform de- burring activity on the machined components

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

PC1. conduct de-burring operations with the help of correct tool to remove extra burrs, sharp edges, rust and chips from the metal surface

PC2. use Personal Protective equipment (PPE) like goggles and hand gloves

PC3. use automated technique to conduct shot blasting/vibro processes for completing de-burring operations

PC4. clean machine parts as per the defined process and quality control standards

Check quality of machined component (Gauging)

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

PC5. check the component as per the control plan, work instructions for product quality

PC6. ensure use of calibrated equipment to check the workpiece for conformance to the required specifications and standards

PC7. note down the observations of the basic inspection process and identify pieces which are as per the specified standards

PC8. separate the defective pieces which can be repaired/reworked and pieces which are beyond repair and maintain records of each category

PC9. get the inspection done by QA in the Standard Room for critical components and record the observations

Perform machine maintenance activities

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

PC10. maintain the machine as per proper operational condition/daily maintenance check list

PC11. clean and oil the machine and its components as per checklist

PC12. clean the hydraulic tank/gauge/tools/fixtures as per the cleaning schedule provided in Work Instruction/SOP manual

PC13. check coolant and lubricant level in the machine as per standards

PC14. apply appropriate lubricant as per manufacturer specification

PC15. remove chips from different machine areas and dispose scrap or waste material into the disposal area in accordance with the company policies and environmental regulations

PC16. verify broaching operations to ensure that the broach teeth are not broken and is free from any metal chips

PC17. carry out minor repairs and adjustments of the machine and report any malfunctions/repairs in the machine beyond own scope to the concerned person

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. Standard Operating Procedures (SOP) recommended by the manufacturer for using tools and measuring instruments used after the machining processes

KU2. the post machining processes like deburring, cleaning, maintenance etc.

KU3. the impact of presence of burrs, edges, chips on the final product quality

KU4. the organisational standard practices for performing maintenance activities

KU5. standard practices recommended by organisation for washing, cleaning and drying processes

KU6. the various inspection methods for inspecting the quality of machined product

Generic Skills (GS)

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

GS1. read and interpret maintenance manuals and SOP

GS2. communicate effectively machine maintenance requirements to the supervisor

GS3. attentively listen and comprehend the instructions given by the lead technician/team members

GS4. write reports and observations related to maintenance work in English/regional language

GS5. discuss task lists and job requirements with co-workers

GS6. recognise maintenance problem and take suitable action

GS7. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Perform de- burring activity on the machined components	**7**	**10**	**-**	**6**
PC1. conduct de-burring operations with the help of correct tool to remove extra burrs, sharp edges, rust and chips from the metal surface	2	5	-	2
PC2. use Personal Protective equipment (PPE) like goggles and hand gloves	1	2	-	1
PC3. use automated technique to conduct shot blasting/vibro processes for completing de-burring operations	2	-	-	2
PC4. clean machine parts as per the defined process and quality control standards	2	3	-	1
Check quality of machined component (Gauging)	**9**	**17**	**-**	**4**
PC5. check the component as per the control plan, work instructions for product quality	1	4	-	-
PC6. ensure use of calibrated equipment to check the workpiece for conformance to the required specifications and standards	2	-	-	2
PC7. note down the observations of the basic inspection process and identify pieces which are as per the specified standards	2	4	-	1
PC8. separate the defective pieces which can be repaired/reworked and pieces which are beyond repair and maintain records of each category	2	5	-	1
PC9. get the inspection done by QA in the Standard Room for critical components and record the observations	2	4	-	-
Perform machine maintenance activities	**14**	**23**	**-**	**10**
PC10. maintain the machine as per proper operational condition/daily maintenance check list	2	3	-	1
PC11. clean and oil the machine and its components as per checklist	2	4	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. clean the hydraulic tank/gauge/tools/fixtures as per the cleaning schedule provided in Work Instruction/SOP manual	3	6	-	1
PC13. check coolant and lubricant level in the machine as per standards	1	2	-	1
PC14. apply appropriate lubricant as per manufacturer specification	1	2	-	-
PC15. remove chips from different machine areas and dispose scrap or waste material into the disposal area in accordance with the company policies and environmental regulations	1	2	-	1
PC16. verify broaching operations to ensure that the broach teeth are not broken and is free from any metal chips	2	-	-	2
PC17. carry out minor repairs and adjustments of the machine and report any malfunctions/repairs in the machine beyond own scope to the concerned person	2	4	-	2
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3509
NOS Name	Perform post machining and maintenance activities
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
NSQF Level	4
Credits	TBD
Version	3.0
Last Reviewed Date	18/08/2020
Next Review Date	20/11/2025
NSQC Clearance Date	20/11/2020

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/N9803.Organize work and resources (Manufacturing)	50	30	-	20	100	10
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	0	0	50	5
ASC/N9805.Interpret engineering drawing	50	30	-	20	100	10
ASC/N3535.Prepare for machining activities	30	50	-	20	100	25
ASC/N3508.Perform machining operations	30	50	-	20	100	25
ASC/N3509.Perform post machining and maintenance activities	30	50	-	20	100	25
Total	**210**	**240**	**0**	**0**	**550**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
SOP	Standard Operating Procedure
GD&T	Geometric Dimensioning & Tolerancing
CAD	Computer-Aided Drafting
CAM	Computer-Aided Manufacturing
CNC	Computerized Numerical Control
WI	Work Instructions
PPE	Personal Protective equipment
SOP	Standard Operating Procedure
GD&T	Geometric Dimensioning & Tolerancing
CAD	Computer-Aided Drafting
CAM	Computer-Aided Manufacturing
SOP	Standard Operating Procedure
CNC	Computerized Numerical Control
GD&T	Geometric Dimensioning & Tolerancing
WI	Work Instructions
CNC	Computerized Numerical Control
SOP	Standard Operating Procedure
SPC	Statistical Process Control
PPE	Personal Protective Equipment
QA	Quality Assurance
SOP	Standard Operating Procedure

Glossary

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

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