Qualification Pack

Machining and Assembly Technician

Semester-1: Engine Assembly/ Semester 1: Vehicle Assembly/ Semester-2: Exports and Packaging/ Semester-2: Forklift Driving

QP Code: ASC/Q6421

Version: 1.0

NSQF Level: 3.5

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Qualification Pack

ASC/Q6421: Machining and Assembly Technician

Brief Job Description

The individual is primarily involved for operating, maintaining, and troubleshooting various machining and assembly equipment used in the production process.

Personal Attributes

The individual must be patient, organized, team-oriented, be able to meet the deadlines for test results and having the ability to work for long hours in adverse conditions. The individual must also be able to communicate effectively.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ASC/N6314: Metrology (Measurement)
2. ASC/N3545: Workshop Technology
3. ASC/N6458: Engineering Drawing
4. DGT/VSQ/N0104: Employability Skills (120 Hours)
5. ASC/N9833: Industrial Safety
6. ASC/N3546: Machining Skills-Drilling ,Milling & Turning
7. ASC/N3547: Machining Skills- CNC Milling
8. ASC/N3548: Machining Skills- CNC Turning
9. ASC/N9835: Applied Mathematics

Options*(Not mandatory):*

Option 1: Semester-1: Engine Assembly

1. ASC/N3622: Engine Assembly

Option 2: Semester 1: Vehicle Assembly

1. ASC/N3623: Vehicle Assembly

Option 3: Semester-2: Exports and Packaging

1. ASC/N6112: Exports and Packaging

Option 4: Semester-2: Forklift Driving

1. ASC/N6113: Forklift Driving

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
Country	India
NSQF Level	3.5
Credits	40
Aligned to NCO/ISCO/ISIC Code	NCO-2015/8211.1201
Minimum Educational Qualification & Experience	10th grade pass OR Certificate-NSQF (Level 3)
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	16 Years
Last Reviewed On	NA
Next Review Date	30/11/2026
NSQC Approval Date	30/11/2023
Version	1.0
Reference code on NQR	QG-3.5-AU-01360-2023-V1-ASDC
NQR Version	1

Remarks:

Mandatory: It is Mandatory to select at least one optional NOS in every semester to meet the 40 credits requirement in a year for diploma progression (As per NCVET Diploma guidelines)

ASC/N6314: Metrology (Measurement)

Description

This NOS unit is about to Employ Metrology Techniques & Tools to inspect the Quality.

Scope

The scope covers the following :

- Identifying the metrology requirements
- Selecting appropriate metrology tools and techniques
- Performing measurements

Elements and Performance Criteria

Identifying the metrology requirements

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

PC1. identify various measuring tools and instruments, such as calipers, micrometers, and coordinate measuring machines (CMMs), to verify the dimensions and tolerances of the manufactured components.

PC2. Ensuring that the manufactured parts meet the specified dimensional requirements is crucial.

PC3. conduct regular checks of the machines with support of the maintenance & Production team to identify Quality Issues.

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.

Selecting appropriate metrology tools and techniques

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

PC5. Research and select the appropriate metrology tools, such as calipers, micrometers, or coordinate measuring machines (CMMs), based on the type of measurements needed and the precision required.

PC6. Determine the most suitable metrology techniques for the specific task, such as dimensional inspection, surface finish analysis, or geometric tolerance verification.

PC7. Ensure that the selected tools are regularly calibrated and well-maintained to guarantee accurate measurements.

PC8. Maintain accurate records of measurements, including any deviations from specified tolerances, and report them to the relevant stakeholders.

Performing measurements

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

PC9. perform quality checks to ensure that the final assembly meets the required metrology standards

PC10. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water.

PC11. Regularly calibrate and maintain metrology tools to ensure their accuracy and reliability.

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. Familiarity with various measuring instruments: A Machining and Assembly Technician should know how to use different measuring tools such as calipers, micrometers, dial indicators, and coordinate measuring machines (CMMs).

KU9. Understanding of geometric dimensions and tolerances (GD&T): GD&T is a language used to define the form, orientation, and location of features on a part. A technician must be able to interpret and apply GD&T symbols to ensure the correct assembly and function of the product.

KU10. Knowledge of quality control and assurance principles: Understanding the importance of maintaining quality standards and implementing quality control measures is essential for a Machining and Assembly Technician.

KU11. Ability to perform inspection and measurement tasks: A technician should be able to perform measurements, compare them with the required specifications, and make necessary adjustments to the manufacturing process to maintain quality.

KU12. Familiarity with statistical process control (SPC): SPC helps to monitor and control the manufacturing process by collecting and analyzing data. A Machining and Assembly Technician should be able to use SPC techniques to identify trends and make improvements in the process.

KU13. Basic understanding of computer-aided design (CAD) and computer-aided manufacturing (CAM): Familiarity with these technologies can help a technician better understand the design intent and make informed decisions during the inspection and assembly processes.

Generic Skills (GS)

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

GS1. read instructions/guidelines/procedures

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
Identifying the metrology requirements	**10**	**20**	**20**	**-**
PC1. identify various measuring tools and instruments, such as calipers, micrometers, and coordinate measuring machines (CMMs), to verify the dimensions and tolerances of the manufactured components.	3	5	5	-
PC2. Ensuring that the manufactured parts meet the specified dimensional requirements is crucial.	3	5	5	-
PC3. conduct regular checks of the machines with support of the maintenance & Production team to identify Quality Issues.	2	5	5	-
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.	2	5	5	-
Selecting appropriate metrology tools and techniques	**5**	**10**	**10**	**-**
PC5. Research and select the appropriate metrology tools, such as calipers, micrometers, or coordinate measuring machines (CMMs), based on the type of measurements needed and the precision required.	1	2	2	-
PC6. Determine the most suitable metrology techniques for the specific task, such as dimensional inspection, surface finish analysis, or geometric tolerance verification.	2	3	3	-
PC7. Ensure that the selected tools are regularly calibrated and well-maintained to guarantee accurate measurements.	1	2	2	-
PC8. Maintain accurate records of measurements, including any deviations from specified tolerances, and report them to the relevant stakeholders.	1	3	3	-
Performing measurements	**5**	**10**	**10**	**-**
PC9. perform quality checks to ensure that the final assembly meets the required metrology standards	2	4	4	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. prepare and analyze material and energy audit reports to decipher excessive consumption of material and water.	2	3	3	-
PC11. Regularly calibrate and maintain metrology tools to ensure their accuracy and reliability.	1	3	3	-
NOS Total	**20**	**40**	**40**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6314
NOS Name	Metrology (Measurement)
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Quality Assurance
NSQF Level	3.5
Credits	4
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N3545: Workshop Technology

Description

This NOS unit is about to Perform the Operations & Technology Associated in the Workshop

Scope

The scope covers the following :

- Maintain a clean and organized workshop environment to promote efficiency and safety.
- Inspecting Machines and tools to ensure they function optimally.
- Ensure efficient and effective vehicle maintenance and repair in the Workshops.

Elements and Performance Criteria

Maintain a clean and organized workshop environment to promote efficiency and safety

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

PC1. Create a schedule for daily, weekly, and monthly cleaning tasks to ensure that the workshop remains tidy and organized. Assign specific responsibilities to each team member

PC2. Use tool cabinets, shelves, and hooks to store tools and equipment in an easily accessible and organized manner. Label storage areas for quick identification

PC3. Provide designated bins for hazardous waste materials such as used oil, batteries, and chemicals. Ensure that these materials are disposed of according to local environmental guidelines.

PC4. Check all equipment, including lifts, hoists, and diagnostic tools, for any signs of wear or damage. Perform routine maintenance and repairs as needed to ensure their safe operation

PC5. Perform periodic inspections of the entire workshop to identify any potential hazards, safety concerns, or areas that require improvement. Address any issues promptly.

Inspecting Machines and tools to ensure they function optimally

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

PC6. visually examining each machine and tool for any signs of wear, damage, or corrosion. Check for loose or missing parts, cracks, and other potential issues.

PC7. Apply appropriate lubricants to moving parts as needed to reduce friction, prevent rust, and ensure smooth operation

PC8. Verify that safety features, like guards and clamps, are intact and functioning correctly

PC9. Ensure that machines and tools are stored properly to prevent damage and maintain organization. Store them in a way that allows for easy access when needed

Ensure efficient and effective vehicle maintenance and repair in the Workshops

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

PC10. Conduct a thorough visual inspection of the vehicle, both inside and outside, to identify any visible issues or areas of concern.

PC11. Use diagnostic tools and equipment to identify specific problems with the vehicle's electrical, mechanical, and electronic systems

PC12. Maintain accurate records of the work performed, including any parts replaced, labor hours, and diagnostic information

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. Vehicle Systems: A strong understanding of various vehicle systems, such as engine, transmission, electrical, suspension, braking, and climate control systems

KU5. Diagnostics: Familiarity with diagnostic tools and techniques to identify issues with electrical, mechanical, and electronic systems

KU6. Automotive Repair and Maintenance: Knowledge of common repair and maintenance procedures, including component replacement, adjustments, and calibrations

KU7. Manufacturer Guidelines: Familiarity with manufacturer-specific guidelines, service schedules, and repair procedures for different makes and models of vehicles

KU8. Electrical and Electronics: Understanding of electrical and electronic components, circuits, and systems, including their functions, troubleshooting, and repair

KU9. Computer Systems: Knowledge of computer systems in vehicles, such as engine control units (ECUs), onboard diagnostics (OBD), and related software

KU10. Tools and Equipment: Familiarity with various tools and equipment used in automotive repair and maintenance, including their proper usage, safety, and maintenance.

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
Maintain a clean and organized workshop environment to promote efficiency and safety	**10**	**20**	**20**	**-**
PC1. Create a schedule for daily, weekly, and monthly cleaning tasks to ensure that the workshop remains tidy and organized. Assign specific responsibilities to each team member	2	4	4	-
PC2. Use tool cabinets, shelves, and hooks to store tools and equipment in an easily accessible and organized manner. Label storage areas for quick identification	2	4	4	-
PC3. Provide designated bins for hazardous waste materials such as used oil, batteries, and chemicals. Ensure that these materials are disposed of according to local environmental guidelines.	2	4	4	-
PC4. Check all equipment, including lifts, hoists, and diagnostic tools, for any signs of wear or damage. Perform routine maintenance and repairs as needed to ensure their safe operation	2	4	4	-
PC5. Perform periodic inspections of the entire workshop to identify any potential hazards, safety concerns, or areas that require improvement. Address any issues promptly.	2	4	4	-
Inspecting Machines and tools to ensure they function optimally	**5**	**10**	**10**	**-**
PC6. visually examining each machine and tool for any signs of wear, damage, or corrosion. Check for loose or missing parts, cracks, and other potential issues.	2	2	2	-
PC7. Apply appropriate lubricants to moving parts as needed to reduce friction, prevent rust, and ensure smooth operation	1	3	3	-
PC8. Verify that safety features, like guards and clamps, are intact and functioning correctly	1	3	3	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC9. Ensure that machines and tools are stored properly to prevent damage and maintain organization. Store them in a way that allows for easy access when needed	1	2	2	-
Ensure efficient and effective vehicle maintenance and repair in the Workshops	**5**	**10**	**10**	**-**
PC10. Conduct a thorough visual inspection of the vehicle, both inside and outside, to identify any visible issues or areas of concern.	1	3	3	-
PC11. Use diagnostic tools and equipment to identify specific problems with the vehicle's electrical, mechanical, and electronic systems	2	4	4	-
PC12. Maintain accurate records of the work performed, including any parts replaced, labor hours, and diagnostic information	2	3	3	-
NOS Total	**20**	**40**	**40**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3545
NOS Name	Workshop Technology
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
NSQF Level	3.5
Credits	4
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N6458: 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	**10**	**20**	**20**	**-**
PC1. interpret engineering drawing's uniqueness, dimensions and important features in 2D and 3D shapes	2	4	4	-
PC2. identify the difference between 2D and 3D shapes	2	4	4	-
PC3. explain difference between first angle projection and third angle projection in mechanical engineering drawing	2	4	4	-
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	2	4	4	-
PC5. identify details of the machine component which are not clearly visible by interpreting section views	2	4	4	-
Identify drawing standards and symbols	**5**	**10**	**10**	**-**
PC6. interpret Geometric Dimensioning and Tolerencing (GD&T) symbols in the drawings	1	2	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	1	2	2	-
PC8. identify the sequence of operations which enables the selection and prioritization of the datums	1	2	2	-
PC9. read and interpret information from Tolerance Zone boundaries for part features in terms of shape and size	2	4	4	-
Modification and storage of drawing	**5**	**10**	**10**	**-**

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	2	5	5	-
PC11. store the drawings in an easily accessible place, avoiding damage from moisture, chemicals and fire	3	5	5	-
NOS Total	**20**	**40**	**40**	**-**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6458
NOS Name	Engineering Drawing
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
NSQF Level	3.5
Credits	4
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

DGT/VSQ/N0104: Employability Skills (120 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. for personal growth and the nation's progress

PC5. follow personal values and ethics such as honesty, integrity, caring and respecting others, etc.

PC6. follow and promote environmentally sustainable practices

Becoming a Professional in the 21st Century

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

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

PC8. 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

PC9. 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:

PC10. use English as a medium of formal and informal communication while dealing with topics of everyday conversation in different contexts

PC11. speak over the phone in English, in an audible manner, using appropriate greetings, opening, and closing statements both on personal and work front

PC12. read and understand routine information, notes, instructions, mails, letters etc. written in English

PC13. write short messages, notes, letters, e-mails etc., using accurate English

Career Development & Goal Setting

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

PC14. identify career goals based on the skills, interests, knowledge, and personal attributes

PC15. 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:

PC16. follow verbal and non-verbal communication etiquette while communicating in professional and public settings

PC17. use active listening techniques for effective communication

PC18. communicate in writing using appropriate style and format based on formal or informal requirements

PC19. work collaboratively with others in a team

Diversity & Inclusion

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

PC20. • ensure personal behaviour, conduct, and use appropriate communication by taking gender into • consideration

PC21. empathize with a PwD and aid a PwD, if asked

PC22. escalate any issues related to sexual harassment at the workplace in accordance with the POSH Act

Financial and Legal Literacy

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

PC23. identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.

PC24. carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook

PC25. identify common components of salary and compute income, expenses, taxes, investments etc

PC26. 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:

PC27. operate digital devices and use their features and applications securely and safely

PC28. 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.

PC29. display responsible online behaviour while using various social media platforms

PC30. create a personal email account, send and process received messages as per requirement

PC31. carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications

PC32. utilize virtual collaboration tools to work effectively

Entrepreneurship

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

PC33. identify different types of Entrepreneurship and Enterprises

PC34. use research and networking skills to identify and assess opportunities for potential business

PC35. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion

PC36. 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:

PC37. identify different types of customers

PC38. identify and respond to customer requests and needs in a professional manner

PC39. use appropriate tools to collect customer feedback

PC40. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC41. create a professional Curriculum vitae (Résumé)

PC42. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC43. apply to identified job openings using offline /online methods as per requirement

PC44. answer questions politely, with clarity and confidence, during recruitment and selection

PC45. 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

KU2. different learning and employability related portals

KU3. various constitutional and personal values

KU4. different environmentally sustainable practices and their importance

KU5. Twenty first (21st) century skills and their importance

KU6. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU7. importance of career development and setting long- and short-term goals

KU8. Do's and don'ts of effective communication

KU9. POSH Act

KU10. inclusivity and its importance

KU11. different types of disabilities and appropriate verbal and non-verbal communication and behaviour towards PwD

KU12. different types of financial institutes, products, and services

KU13. components of salary and how to compute income and expenditure

KU14. importance of maintaining safety and security in offline and online financial transactions

KU15. different legal rights and laws

KU16. different types of digital devices and the procedure to operate them safely and securely

KU17. how to create and operate an e- mail account

KU18. use applications such as word processors, spreadsheets etc.

KU19. different types of Enterprises and ways to identify business opportunities

KU20. types and needs of customers

KU21. how to apply for a job and prepare for an interview

KU22. 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
Introduction to Employability Skills	**1**	**1**	**-**	**-**
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	**2**	**1**	**-**	**-**
PC4. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. for personal growth and the nation's progress	-	-	-	-
PC5. follow personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC6. follow and promote environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**2**	**3**	**-**	**-**
PC7. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC8. 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	-	-	-	-
PC9. adopt a continuous learning mindset for personal and professional development	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. use English as a medium of formal and informal communication while dealing with topics of everyday conversation in different contexts	-	-	-	-
PC11. speak over the phone in English, in an audible manner, using appropriate greetings, opening, and closing statements both on personal and work front	-	-	-	-
PC12. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC13. write short messages, notes, letters, e-mails etc., using accurate English	-	-	-	-
Career Development & Goal Setting	**1**	**2**	**-**	**-**
PC14. identify career goals based on the skills, interests, knowledge, and personal attributes	-	-	-	-
PC15. prepare a career development plan with short- and long-term goals	-	-	-	-
Communication Skills	**2**	**3**	**-**	**-**
PC16. follow verbal and non-verbal communication etiquette while communicating in professional and public settings	-	-	-	-
PC17. use active listening techniques for effective communication	-	-	-	-
PC18. communicate in writing using appropriate style and format based on formal or informal requirements	-	-	-	-
PC19. work collaboratively with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**2**	**-**	**-**
PC20. • ensure personal behaviour, conduct, and use appropriate communication by taking gender into • consideration	-	-	-	-
PC21. empathize with a PwD and aid a PwD, if asked	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. escalate any issues related to sexual harassment at the workplace in accordance with the POSH Act	-	-	-	-
Financial and Legal Literacy	**2**	**3**	**-**	**-**
PC23. identify and select reliable institutions for various financial products and services such as bank account, debit and credit cards, loans, insurance etc.	-	-	-	-
PC24. carry out offline and online financial transactions, safely and securely, using various methods and check the entries in the passbook	-	-	-	-
PC25. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC26. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
Essential Digital Skills	**2**	**3**	**-**	**-**
PC27. operate digital devices and use their features and applications securely and safely	-	-	-	-
PC28. 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.	-	-	-	-
PC29. display responsible online behaviour while using various social media platforms	-	-	-	-
PC30. create a personal email account, send and process received messages as per requirement	-	-	-	-
PC31. carry out basic procedures in documents, spreadsheets and presentations using respective and appropriate applications	-	-	-	-
PC32. utilize virtual collaboration tools to work effectively	-	-	-	-
Entrepreneurship	**2**	**3**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC33. identify different types of Entrepreneurship and Enterprises	-	-	-	-
PC34. use research and networking skills to identify and assess opportunities for potential business	-	-	-	-
PC35. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC36. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
Customer Service	**1**	**2**	**-**	**-**
PC37. identify different types of customers	-	-	-	-
PC38. identify and respond to customer requests and needs in a professional manner	-	-	-	-
PC39. use appropriate tools to collect customer feedback	-	-	-	-
PC40. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**2**	**4**	**-**	**-**
PC41. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC42. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC43. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC44. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC45. 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/N0104
NOS Name	Employability Skills (120 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	6
Credits	4
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N9833: Industrial Safety

Description

This NOS is about to Maintain a healthy and productive work environment by adhering Industrial Safety

Scope

The scope covers the following :

- Perform periodic assessments of the workplace to identify potential hazards.
- Establish guidelines and procedures for handling, storing, and disposing of hazardous material.
- Regularly inspect and maintain machine guards to prevent unguarded access.

Elements and Performance Criteria

Perform periodic assessments of the workplace to identify potential hazards

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

PC1. Determine the frequency of assessments based on the nature of work, regulatory requirements, and risk levels associated with the machining and assembly processes.

PC2. Develop a checklist covering various aspects of the workplace, including machinery, tools, workstations, storage areas, and general housekeeping.

PC3. inspect the workplace, focusing on potential hazards such as exposed wires, damaged equipment, cluttered workspaces, and improperly stored materials.

PC4. Evaluate the condition of machines and equipment, checking for wear and tear, proper guarding, and adherence to safety protocols

Establish guidelines and procedures for handling, storing, and disposing of hazardous material

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

PC5. Determine the types of hazardous materials used in the workshop, such as solvents, lubricants, cutting fluids, and chemicals.

PC6. Create a detailed plan outlining the storage locations, quantities, and safety measures for each hazardous material.

PC7. Establish guidelines for the use of appropriate PPE when handling hazardous materials, such as gloves, goggles, face shields, and respirators.

PC8. develop standard operating procedures for the safe handling of hazardous materials, including proper pouring, transferring, and disposal methods.

Regularly inspect and maintain machine guards to prevent unguarded access.

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

PC9. Review and adhere to the safety guidelines provided by the manufacturer, Occupational Safety and Health Administration (OSHA), or other relevant regulatory bodies.

PC10. Conduct a thorough visual inspection of all machine guards in the workshop, checking for any visible signs of damage, wear, or deformation.

PC11. Establish a routine maintenance schedule for machine guards, including cleaning, lubrication, and hardware inspections. Document the maintenance activities and their frequencies for future reference.

PC12. Regularly verify that machine guards meet the required safety standards and regulatory compliance. Update guards or processes as needed to maintain compliance.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant manufacturing, quality and maintenance standards and procedures followed in the organisation

KU2. functional processes like Procurement, Store management, inventory management, quality management and key contact points for query resolution

KU3. requirement of raw materials, tools and equipment on the shift/line

KU4. how to prepare shift roster and maintain performance information of the team

KU5. Safety Policies and Procedures: Understanding and adhering to the safety policies and procedures established by the organization, which may include guidelines from OSHA, ISO, or other regulatory bodies.

KU6. Hazard Identification: Recognizing potential hazards in the workplace, such as chemical, electrical, mechanical, or ergonomic risks, and understanding the associated risks and consequences.

KU7. Risk Assessment and Control: Ability to assess risks and implement appropriate control measures to minimize or eliminate hazards, such as using personal protective equipment (PPE), implementing engineering controls, or modifying work processes.

KU8. Emergency Preparedness: Knowledge of emergency response procedures, such as fire evacuation plans, first aid, and reporting procedures in case of accidents or incidents.

KU9. Communication and Collaboration: Effective communication skills to share safety-related information, report hazards, and collaborate with colleagues to maintain a safe working environment.

Generic Skills (GS)

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

GS1. read and interpret work instructions, reports and process documents

GS2. communicate the production requirements and issues to the seniors and other departments

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

GS4. write reports related to production process 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 work requirements

GS8. report to the supervisor or deal with a colleague individually, depending on the type of concern

GS9. complete the assigned tasks with minimum supervision

GS10. explore new approach of doing things to resolve issues

GS11. suggest improvements (if any) in current ways of working

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Perform periodic assessments of the workplace to identify potential hazards	**5**	**10**	**10**	**-**
PC1. Determine the frequency of assessments based on the nature of work, regulatory requirements, and risk levels associated with the machining and assembly processes.	2	3	3	-
PC2. Develop a checklist covering various aspects of the workplace, including machinery, tools, workstations, storage areas, and general housekeeping.	1	3	3	-
PC3. inspect the workplace, focusing on potential hazards such as exposed wires, damaged equipment, cluttered workspaces, and improperly stored materials.	1	2	2	-
PC4. Evaluate the condition of machines and equipment, checking for wear and tear, proper guarding, and adherence to safety protocols	1	2	2	-
Establish guidelines and procedures for handling, storing, and disposing of hazardous material	**5**	**10**	**10**	**-**
PC5. Determine the types of hazardous materials used in the workshop, such as solvents, lubricants, cutting fluids, and chemicals.	1	3	3	-
PC6. Create a detailed plan outlining the storage locations, quantities, and safety measures for each hazardous material.	2	3	3	-
PC7. Establish guidelines for the use of appropriate PPE when handling hazardous materials, such as gloves, goggles, face shields, and respirators.	1	2	2	-
PC8. develop standard operating procedures for the safe handling of hazardous materials, including proper pouring, transferring, and disposal methods.	1	2	2	-
Regularly inspect and maintain machine guards to prevent unguarded access.	**5**	**10**	**10**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC9. Review and adhere to the safety guidelines provided by the manufacturer, Occupational Safety and Health Administration (OSHA), or other relevant regulatory bodies.	2	3	3	-
PC10. Conduct a thorough visual inspection of all machine guards in the workshop, checking for any visible signs of damage, wear, or deformation.	1	2	2	-
PC11. Establish a routine maintenance schedule for machine guards, including cleaning, lubrication, and hardware inspections. Document the maintenance activities and their frequencies for future reference.	1	3	3	-
PC12. Regularly verify that machine guards meet the required safety standards and regulatory compliance. Update guards or processes as needed to maintain compliance.	1	2	2	-
NOS Total	**15**	**30**	**30**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9833
NOS Name	Industrial Safety
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Generic
NSQF Level	3.5
Credits	3
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N3546: Machining Skills-Drilling ,Milling & Turning

Description

This NOS is about to Create precise and functional parts using Machining Skills-Drilling, Milling & Turning.

Scope

The scope covers the following :

- Prepare Machining Equipment
- Execute Machining Operations
- Select Appropriate Tools for Operations
- Perform In-Process Inspections of Machined Part

Elements and Performance Criteria

Prepare Machining Equipment

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

PC1. Prepare machining equipment for production runs by installing fixtures, tooling, and work pieces.

PC2. support Shift In Charge/Process head/Shop head in finalizing the shift rosters for the week and month based on the production plan

PC3. Verify machine alignments and ensure proper calibration of tools and equipment

PC4. Load materials into machines and secure them in place for machining.

PC5. maintain the movement of material and work pieces on the shop floor according to the TAKT time prescribed in the SOP/Work Plans

PC6. ensure that the operators and helpers have the required tools and equipment at the start of production process

PC7. ensure optimal resource utilization (man, machine and material) and streamlining of activities within the shift

Execute Machining Operations

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

PC8. Monitor machine performance and make adjustments to cutting speeds, feeds, and tool paths as necessary.

PC9. Maintain consistent production flow by monitoring machine status and addressing any issues promptly.

PC10. Verify machining operations according to job orders, blueprints, or work instructions.

PC11. verify the production and material movement related data entries in the system (manual/ERP) for the line/shift and ensure correctness of the data

PC12. support the maintenance team in finalizing and executing the preventive maintenance schedule for the shop/line

PC13. support the incharge/Engineer/Shop Head in analysing the various data sheets and reports related to production, maintenance, manpower deployment etc.

Select Appropriate Tools for Operations

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

PC14. Select appropriate cutting tools, inserts, and fixtures based on job requirements

PC15. Install, align, and secure cutting tools in tool holders or machine spindles

PC16. Monitor tool wear and change tools as needed to ensure optimal machining performance

PC17. analyse machine breakdown trends and current maintenance process to identify areas of improvement and corrective actions for improving the same

PC18. Adhere to safety protocols and procedures while operating machining equipment.

Perform In-Process Inspections of Machined Part

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

PC19. encourage team members/operators to suggest quality improvement measures through suggestion schemes, evaluate feasibility of the ideas and discuss their implementation with seniors

PC20. Verify in-process inspections of machined parts using precision measuring instruments

PC21. Verify dimensional accuracy, surface finish, and other critical features against engineering specifications

PC22. Identify and address any deviations from quality standards, including adjusting machine settings or tooling as required

PC23. Perform routine maintenance tasks such as lubrication, cleaning, and tool changes to keep machines running smoothly

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant manufacturing, quality and maintenance standards and procedures followed in the organisation

KU2. functional processes like Procurement, Store management, inventory management, quality management and key contact points for query resolution

KU3. requirement of raw materials, tools and equipment on the shift/line

KU4. how to prepare shift roster and maintain performance information of the team

KU5. use of ERP system for maintaining and updating production line data

KU6. documents and reports related to production process

KU7. various process improvement techniques like Kaizen, 5S, Poka Yoke, TQM etc

KU8. how to audit gaps and issues in production process and their analysis

KU9. various employee engagement and development practices

KU10. how to handle and solve employee grievances

Generic Skills (GS)

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

GS1. read and interpret work instructions, reports and process documents

GS2. communicate the production requirements and issues to the seniors and other departments

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

GS4. write reports related to production process 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 work requirements

GS8. report to the supervisor or deal with a colleague individually, depending on the type of concern

GS9. complete the assigned tasks with minimum supervision

GS10. explore new approach of doing things to resolve issues

GS11. suggest improvements (if any) in current ways of working

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare Machining Equipment	**5**	**20**	**20**	**-**
PC1. Prepare machining equipment for production runs by installing fixtures, tooling, and work pieces.	1	3	3	-
PC2. support Shift In Charge/Process head/Shop head in finalizing the shift rosters for the week and month based on the production plan	1	3	3	-
PC3. Verify machine alignments and ensure proper calibration of tools and equipment	1	3	3	-
PC4. Load materials into machines and secure them in place for machining.	-	2	2	-
PC5. maintain the movement of material and work pieces on the shop floor according to the TAKT time prescribed in the SOP/Work Plans	-	3	3	-
PC6. ensure that the operators and helpers have the required tools and equipment at the start of production process	1	3	3	-
PC7. ensure optimal resource utilization (man, machine and material) and streamlining of activities within the shift	1	3	3	-
Execute Machining Operations	**5**	**5**	**5**	**-**
PC8. Monitor machine performance and make adjustments to cutting speeds, feeds, and tool paths as necessary.	-	1	1	-
PC9. Maintain consistent production flow by monitoring machine status and addressing any issues promptly.	1	1	1	-
PC10. Verify machining operations according to job orders, blueprints, or work instructions.	1	1	1	-
PC11. verify the production and material movement related data entries in the system (manual/ERP) for the line/shift and ensure correctness of the data	1	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. support the maintenance team in finalizing and executing the preventive maintenance schedule for the shop/line	1	1	1	-
PC13. support the incharge/Engineer/Shop Head in analysing the various data sheets and reports related to production, maintenance, manpower deployment etc.	1	1	1	-
Select Appropriate Tools for Operations	**5**	**8**	**8**	**-**
PC14. Select appropriate cutting tools, inserts, and fixtures based on job requirements	1	2	2	-
PC15. Install, align, and secure cutting tools in tool holders or machine spindles	1	1	1	-
PC16. Monitor tool wear and change tools as needed to ensure optimal machining performance	1	2	2	-
PC17. analyse machine breakdown trends and current maintenance process to identify areas of improvement and corrective actions for improving the same	1	1	1	-
PC18. Adhere to safety protocols and procedures while operating machining equipment.	1	2	2	-
Perform In-Process Inspections of Machined Part	**5**	**7**	**7**	**-**
PC19. encourage team members/operators to suggest quality improvement measures through suggestion schemes, evaluate feasibility of the ideas and discuss their implementation with seniors	1	2	2	-
PC20. Verify in-process inspections of machined parts using precision measuring instruments	1	2	2	-
PC21. Verify dimensional accuracy, surface finish, and other critical features against engineering specifications	1	1	1	-
PC22. Identify and address any deviations from quality standards, including adjusting machine settings or tooling as required	1	1	1	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. Perform routine maintenance tasks such as lubrication, cleaning, and tool changes to keep machines running smoothly	1	1	1	-
NOS Total	**20**	**40**	**40**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3546
NOS Name	Machining Skills-Drilling ,Milling & Turning
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
NSQF Level	3.5
Credits	4
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N3547: Machining Skills- CNC Milling

Description

This NOS is about to Optimize Machining Skills- CNC Milling.

Scope

The scope covers the following :

- Prepare for the CNC Milling machining operations.
- Perform machining activities.
- Manage post-machining activities.

Elements and Performance Criteria

Prepare for the Milling machining operations

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

PC1. take inputs from the master machining technician regarding production planning

PC2. prepare plan and schedule to meet the production target and give instructions to the machining operators and technicians about the processes required to be performed for achieving the same

PC3. ensure that all the tools, measuring instruments and input materials required for the job are in stock, functioning properly and available on the shopfloor

PC4. ensure that input materials are as per the control plan/check sheet and required quality standards

PC5. select the CNC program and make changes/ modifications in the program to increase tool life, product quality and production as per the work instructions and production requirements

PC6. ensure that the CNC program is covering all the machine and process parameters, raw materials, cycle time, coolant and lubricant flow etc. as per the equipment operating guidelines

PC7. carry out dry run of the program to test and validate its effectiveness and accuracy on machine and if necessary, modify it as per the requirements and SOPs/Work Instructions

PC8. check that machine is set for operation and all tools, attachments and fixtures are mounted, installed and aligned properly on the machine

PC9. support the machining operators and technicians in setting of the machine parameters like cutting speed, depth of cut and feed rate and positioning of cutting tool and work piece as per the work instructions

Perform machining activities

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

PC10. start the machine, produce the first component and inspect it for conformance to required specifications by using precision gauges

PC11. check the output for quality, fill run chart and correct the tool setting to meet the required quality output

PC12. run the machine for mass production of components, if the first run-piece meets the specified requirements

PC13. supervise the machining operations and mass production process of component to ensure delivery as per plan

PC14. ensure that machining operators and technicians are following the do's and don'ts of the manufacturing process as defined in SOPs/Work Instructions

PC15. take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc.

PC16. observe the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction

PC17. monitor the process parameters on regular basis and ensure compliance to agreed standards (e.g. ambient air quality, stack monitoring, water quality monitoring etc.)

PC18. record the data related to the loss time in case of machine stops and breakdown and report the same to the supervisors and maintenance team

PC19. maintain the record of tool offsetting and key dimensions on control charts/SPC record as per organization policies

Manage post-machining activities

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

PC20. conduct random sampling and quality checks on the incoming and finished products and report the same to the relevant authorities or take action for its improvement

PC21. ensure that the machining operators and technicians are segregating and storing the machined pieces properly and are as per the specified standards

PC22. support the machining operators and technicians in minor machine maintenance activities such as oiling or cleaning of machine and its components as per the checklist

PC23. check the machine operation for proper working after maintenance activities

PC24. prepare and maintain records related to machining and maintenance activities conducted

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. fundamentals of the CNC/conventional machine

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

KU3. SOP recommended by the manufacturer for using tools, jigs, fixtures, measuring instruments etc., during the machining processes

KU4. how to select and modify the CNC machining program

KU5. SOP recommended by the organisation for operating CNC and conventional machine

KU6. CAD/CAM Software: Proficiency in Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) software to create and modify designs for CNC milling, as well as to generate toolpaths for the machine

KU7. G-Code Programming: Understanding G-code, the programming language used to control CNC machines, including various commands, parameters, and toolpath strategies

KU8. Machine Tools and Accessories: Knowledge of different CNC milling machines, their capabilities, and accessories such as spindles, coolants, fixtures, and clamping systems.

KU9. Cutting Tools: Understanding the properties, applications, and maintenance of various cutting tools, including end mills, drills, and taps, to achieve optimal cutting performance and minimize wear.

KU10. Materials and Workpiece Handling: Knowledge of different materials' properties, their behavior during machining, and appropriate handling techniques to ensure accurate and efficient machining.

KU11. Toolpath Strategies and Optimization: Ability to select and optimize toolpaths based on the workpiece geometry, material, and desired finish, considering factors like chip load, feed rates, and cutting speeds.

KU12. Machine Setup and Calibration: Understanding the importance of proper machine setup, including tool length measurement, work offsets, and calibration of linear and rotary axes, to ensure accurate and repeatable machining.

Generic Skills (GS)

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

GS1. read and interpret work instructions, machine drawings, reports and process documents

GS2. communicate the machining requirements to the seniors and other departments

GS3. communicate issues to the supervisor that occur during machining process

GS4. attentively listen and comprehend the information given by the master technician/team members

GS5. write reports related to production process in English/regional language

GS6. recognise a workplace problem and take suitable action

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

GS8. plan and organise work according to the work requirements

GS9. report to the supervisor or deal with a colleague individually, depending on the type of concern

GS10. complete the assigned tasks with minimum supervision

GS11. suggest improvements (if any) in current ways of working

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare for the Milling machining operations	**10**	**20**	**20**	**-**
PC1. take inputs from the master machining technician regarding production planning	1	2	2	-
PC2. prepare plan and schedule to meet the production target and give instructions to the machining operators and technicians about the processes required to be performed for achieving the same	2	3	3	-
PC3. ensure that all the tools, measuring instruments and input materials required for the job are in stock, functioning properly and available on the shopfloor	1	3	3	-
PC4. ensure that input materials are as per the control plan/check sheet and required quality standards	1	2	2	-
PC5. select the CNC program and make changes/ modifications in the program to increase tool life, product quality and production as per the work instructions and production requirements	1	2	2	-
PC6. ensure that the CNC program is covering all the machine and process parameters, raw materials, cycle time, coolant and lubricant flow etc. as per the equipment operating guidelines	1	2	2	-
PC7. carry out dry run of the program to test and validate its effectiveness and accuracy on machine and if necessary, modify it as per the requirements and SOPs/Work Instructions	1	2	2	-
PC8. check that machine is set for operation and all tools, attachments and fixtures are mounted, installed and aligned properly on the machine	1	2	2	-
PC9. support the machining operators and technicians in setting of the machine parameters like cutting speed, depth of cut and feed rate and positioning of cutting tool and work piece as per the work instructions	1	2	2	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Perform machining activities	**5**	**10**	**10**	**-**
PC10. start the machine, produce the first component and inspect it for conformance to required specifications by using precision gauges	1	1	1	-
PC11. check the output for quality, fill run chart and correct the tool setting to meet the required quality output	1	1	2	-
PC12. run the machine for mass production of components, if the first run-piece meets the specified requirements	1	1	1	-
PC13. supervise the machining operations and mass production process of component to ensure delivery as per plan	-	1	2	-
PC14. ensure that machining operators and technicians are following the do's and don'ts of the manufacturing process as defined in SOPs/Work Instructions	-	1	1	-
PC15. take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc.	-	1	1	-
PC16. observe the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction	1	1	-	-
PC17. monitor the process parameters on regular basis and ensure compliance to agreed standards (e.g. ambient air quality, stack monitoring, water quality monitoring etc.)	1	1	-	-
PC18. record the data related to the loss time in case of machine stops and breakdown and report the same to the supervisors and maintenance team	-	1	1	-
PC19. maintain the record of tool offsetting and key dimensions on control charts/SPC record as per organization policies	-	1	1	-
Manage post-machining activities	**5**	**10**	**10**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. conduct random sampling and quality checks on the incoming and finished products and report the same to the relevant authorities or take action for its improvement	1	2	2	-
PC21. ensure that the machining operators and technicians are segregating and storing the machined pieces properly and are as per the specified standards	1	2	2	-
PC22. support the machining operators and technicians in minor machine maintenance activities such as oiling or cleaning of machine and its components as per the checklist	1	2	2	-
PC23. check the machine operation for proper working after maintenance activities	1	2	2	-
PC24. prepare and maintain records related to machining and maintenance activities conducted	1	2	2	-
NOS Total	**20**	**40**	**40**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3547
NOS Name	Machining Skills- CNC Milling
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
NSQF Level	3.5
Credits	4
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N3548: Machining Skills- CNC Turning

Description

This NOS is about to Optimize Machining Skills- CNC Turning

Scope

The scope covers the following :

- Prepare for the CNC Turning operations.
- Perform Turning activities.
- Manage post-Turning activities.

Elements and Performance Criteria

Prepare for the CNC Turning operations

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

PC1. take inputs from the master machining technician regarding production planning

PC2. prepare plan and schedule to meet the production target and give instructions to the machining operators and technicians about the processes required to be performed for achieving the same

PC3. ensure that all the tools, measuring instruments and input materials required for the job are in stock, functioning properly and available on the shopfloor

PC4. ensure that input materials are as per the control plan/check sheet and required quality standards

PC5. select the CNC program and make changes/ modifications in the program to increase tool life, product quality and production as per the work instructions and production requirements

PC6. ensure that the CNC program is covering all the machine and process parameters, raw materials, cycle time, coolant and lubricant flow etc. as per the equipment operating guidelines

PC7. carry out dry run of the program to test and validate its effectiveness and accuracy on machine and if necessary, modify it as per the requirements and SOPs/Work Instructions

PC8. check that machine is set for operation and all tools, attachments and fixtures are mounted, installed and aligned properly on the machine

PC9. support the machining operators and technicians in setting of the machine parameters like cutting speed, depth of cut and feed rate and positioning of cutting tool and work piece as per the work instructions

Perform Turning activities

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

PC10. start the machine, produce the first component and inspect it for conformance to required specifications by using precision gauges

PC11. check the output for quality, fill run chart and correct the tool setting to meet the required quality output

PC12. run the machine for mass production of components, if the first run-piece meets the specified requirements

PC13. supervise the machining operations and mass production process of component to ensure delivery as per plan

PC14. ensure that machining operators and technicians are following the do's and don'ts of the manufacturing process as defined in SOPs/Work Instructions

PC15. take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc.

PC16. observe the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction

PC17. monitor the process parameters on regular basis and ensure compliance to agreed standards (e.g. ambient air quality, stack monitoring, water quality monitoring etc.)

PC18. record the data related to the loss time in case of machine stops and breakdown and report the same to the supervisors and maintenance team

PC19. maintain the record of tool offsetting and key dimensions on control charts/SPC record as per organization policies

Manage post- Turning activities

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

PC20. conduct random sampling and quality checks on the incoming and finished products and report the same to the relevant authorities or take action for its improvement

PC21. ensure that the machining operators and technicians are segregating and storing the machined pieces properly and are as per the specified standards

PC22. support the machining operators and technicians in minor machine maintenance activities such as oiling or cleaning of machine and its components as per the checklist

PC23. check the machine operation for proper working after maintenance activities

PC24. prepare and maintain records related to machining and maintenance activities conducted

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. fundamentals of the CNC/conventional machine

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

KU3. SOP recommended by the manufacturer for using tools, jigs, fixtures, measuring instruments etc., during the machining processes

KU4. how to select and modify the CNC machining program

KU5. SOP recommended by the organisation for operating CNC and conventional machine

KU6. CNC turning, such as cutting speeds and feeds, tool geometry, and chip formation.

KU7. CAD and CAM Software: Familiarity with Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) software to create and modify part designs, as well as generate toolpaths for CNC machines.

KU8. CNC Machine Operation: Knowledge of CNC turning machines, including different types of lathes, spindle configurations, and turret tooling options.

KU9. Tooling and Accessories: Understanding various cutting tools, tool holders, and accessories, such as live tooling, sub-spindles, and chucks, and their applications in CNC turning.

KU10. Material Selection: Knowledge of different materials and their properties, including their machinability, heat treatment, and surface finishing requirements.

KU11. Cutting Fluids and Coolants: Understanding the role of cutting fluids and coolants in CNC turning, their types, and their application methods to enhance machining performance and tool life.

KU12. Quality Control and Inspection: Knowledge of quality control processes, inspection techniques, and measurement tools to ensure the accuracy and consistency of machined parts.

Generic Skills (GS)

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

GS1. read and interpret work instructions, machine drawings, reports and process documents

GS2. communicate the machining requirements to the seniors and other departments

GS3. communicate issues to the supervisor that occur during machining process

GS4. attentively listen and comprehend the information given by the master technician/team members

GS5. write reports related to production process in English/regional language

GS6. recognise a workplace problem and take suitable action

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

GS8. plan and organise work according to the work requirements

GS9. report to the supervisor or deal with a colleague individually, depending on the type of concern

GS10. complete the assigned tasks with minimum supervision

GS11. suggest improvements (if any) in current ways of working

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare for the CNC Turning operations	**10**	**20**	**20**	**-**
PC1. take inputs from the master machining technician regarding production planning	1	2	2	-
PC2. prepare plan and schedule to meet the production target and give instructions to the machining operators and technicians about the processes required to be performed for achieving the same	2	3	3	-
PC3. ensure that all the tools, measuring instruments and input materials required for the job are in stock, functioning properly and available on the shopfloor	1	3	3	-
PC4. ensure that input materials are as per the control plan/check sheet and required quality standards	1	2	2	-
PC5. select the CNC program and make changes/ modifications in the program to increase tool life, product quality and production as per the work instructions and production requirements	1	2	2	-
PC6. ensure that the CNC program is covering all the machine and process parameters, raw materials, cycle time, coolant and lubricant flow etc. as per the equipment operating guidelines	1	2	2	-
PC7. carry out dry run of the program to test and validate its effectiveness and accuracy on machine and if necessary, modify it as per the requirements and SOPs/Work Instructions	1	2	2	-
PC8. check that machine is set for operation and all tools, attachments and fixtures are mounted, installed and aligned properly on the machine	1	2	2	-
PC9. support the machining operators and technicians in setting of the machine parameters like cutting speed, depth of cut and feed rate and positioning of cutting tool and work piece as per the work instructions	1	2	2	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Perform Turning activities	**5**	**10**	**10**	**-**
PC10. start the machine, produce the first component and inspect it for conformance to required specifications by using precision gauges	1	1	1	-
PC11. check the output for quality, fill run chart and correct the tool setting to meet the required quality output	1	1	2	-
PC12. run the machine for mass production of components, if the first run-piece meets the specified requirements	1	1	1	-
PC13. supervise the machining operations and mass production process of component to ensure delivery as per plan	-	1	2	-
PC14. ensure that machining operators and technicians are following the do's and don'ts of the manufacturing process as defined in SOPs/Work Instructions	-	1	1	-
PC15. take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc.	-	1	1	-
PC16. observe the machine operations for any malfunctions/defects in the component and immediately inform the supervisor/maintenance team for correction	1	1	-	-
PC17. monitor the process parameters on regular basis and ensure compliance to agreed standards (e.g. ambient air quality, stack monitoring, water quality monitoring etc.)	1	1	-	-
PC18. record the data related to the loss time in case of machine stops and breakdown and report the same to the supervisors and maintenance team	-	1	1	-
PC19. maintain the record of tool offsetting and key dimensions on control charts/SPC record as per organization policies	-	1	1	-
Manage post- Turning activities	**5**	**10**	**10**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. conduct random sampling and quality checks on the incoming and finished products and report the same to the relevant authorities or take action for its improvement	1	2	2	-
PC21. ensure that the machining operators and technicians are segregating and storing the machined pieces properly and are as per the specified standards	1	2	2	-
PC22. support the machining operators and technicians in minor machine maintenance activities such as oiling or cleaning of machine and its components as per the checklist	1	2	2	-
PC23. check the machine operation for proper working after maintenance activities	1	2	2	-
PC24. prepare and maintain records related to machining and maintenance activities conducted	1	2	2	-
NOS Total	**20**	**40**	**40**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3548
NOS Name	Machining Skills- CNC Turning
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining Operation
NSQF Level	3.5
Credits	4
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N9835: Applied Mathematics

Description

This NOS is about to Analyze and optimize various processes, such as cutting speeds, feeds, and tool path planning using Applied Mathematics.

Scope

The scope covers the following :

- Developing mathematical models to represent the processes.
- Applying optimization techniques to find the best possible solutions for process parameters.
- Developing control systems and monitoring strategies to maintain optimal process conditions.

Elements and Performance Criteria

Developing mathematical models to represent the processes

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

PC1. Identify the specific process or problem to be modeled, such as optimizing cutting speeds and feeds for a CNC milling operation or planning efficient tool paths for a complex part.

PC2. Gather relevant data and information about the process, including material properties, tool specifications, and machine capabilities.

PC3. Select appropriate mathematical models, equations, or algorithms to represent the process.

PC4. Develop the mathematical model by incorporating the collected data and chosen mathematical formulations.

Applying optimization techniques to find the best possible solutions for process parameters

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

PC5. Identify the constraints, like tool life, material properties, or machine capabilities

PC6. Develop a mathematical model that represents the relationship between the process parameters and the desired outcomes.

PC7. Adjust the optimization algorithm's parameters to achieve the best performance for the specific problem.

PC8. Analyze the results obtained from the optimization process, including the optimal values of cutting speeds, feeds, and tool path planning parameters

Developing control systems and monitoring strategies to maintain optimal process conditions.

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

PC9. Create mathematical models that represent the dynamic behavior of the process or system under consideration

PC10. Estimate the parameters of the model based on available data from the process, using techniques such as regression analysis, least squares, or maximum likelihood estimation.

PC11. Develop control strategies to regulate the process variables and maintain them within desired operating conditions.

PC12. Apply optimization techniques, such as linear programming, dynamic programming, or genetic algorithms, to minimize costs, maximize throughput, or improve overall process efficiency.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. fundamentals of the CNC/conventional machine

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

KU3. SOP recommended by the manufacturer for using tools, jigs, fixtures, measuring instruments etc., during the machining processes

KU4. how to select and modify the CNC machining program

KU5. SOP recommended by the organisation for operating CNC and conventional machine

KU6. To analyze and optimize various processes, such as cutting speeds, feeds, and tool path planning, using applied mathematics, the following knowledge and understanding skills are essential

KU7. Calculus: Proficiency in differentiation and integration techniques to model and analyze the relationships between process variables, such as cutting speed, feed rate, and tool life

KU8. Differential Equations: Ability to develop and solve differential equations to describe the dynamic behavior of processes and systems, including ordinary and partial differential equations

KU9. Linear Algebra: Understanding of vector and matrix operations, eigenvalues, and eigenvectors to analyze and optimize processes involving multiple variables and constraints

KU10. Optimization Techniques: Knowledge of various optimization methods, such as gradient descent, genetic algorithms, or simulated annealing, to find the optimal values of cutting speed, feed rate, and tool path planning

KU11. Statistics and Probability: Ability to analyze and interpret data collected from the processes, using statistical methods like hypothesis testing, regression analysis, and probability distributions to make informed decisions.

KU12. Discrete Mathematics: Familiarity with combinatorics, graph theory, and network flow analysis to optimize tool path planning and minimize machining time.

KU13. Numerical Methods: Understanding of numerical techniques, such as finite difference, finite element, or boundary element methods, to solve complex problems involving continuous processes.

Generic Skills (GS)

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

GS1. read and interpret work instructions, machine drawings, reports and process documents

GS2. communicate the machining requirements to the seniors and other departments

GS3. communicate issues to the supervisor that occur during machining process

GS4. attentively listen and comprehend the information given by the master technician/team members

GS5. write reports related to production process in English/regional language

GS6. recognise a workplace problem and take suitable action

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

GS8. plan and organise work according to the work requirements

GS9. report to the supervisor or deal with a colleague individually, depending on the type of concern

GS10. complete the assigned tasks with minimum supervision

GS11. suggest improvements (if any) in current ways of working

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Developing mathematical models to represent the processes	**5**	**10**	**10**	**-**
PC1. Identify the specific process or problem to be modeled, such as optimizing cutting speeds and feeds for a CNC milling operation or planning efficient tool paths for a complex part.	1	2	2	-
PC2. Gather relevant data and information about the process, including material properties, tool specifications, and machine capabilities.	2	3	3	-
PC3. Select appropriate mathematical models, equations, or algorithms to represent the process.	1	3	3	-
PC4. Develop the mathematical model by incorporating the collected data and chosen mathematical formulations.	1	2	2	-
Applying optimization techniques to find the best possible solutions for process parameters	**5**	**10**	**10**	**-**
PC5. Identify the constraints, like tool life, material properties, or machine capabilities	1	3	3	-
PC6. Develop a mathematical model that represents the relationship between the process parameters and the desired outcomes.	1	2	2	-
PC7. Adjust the optimization algorithm's parameters to achieve the best performance for the specific problem.	1	3	3	-
PC8. Analyze the results obtained from the optimization process, including the optimal values of cutting speeds, feeds, and tool path planning parameters	2	2	2	-
Developing control systems and monitoring strategies to maintain optimal process conditions.	**5**	**10**	**10**	**-**
PC9. Create mathematical models that represent the dynamic behavior of the process or system under consideration	1	2	2	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Estimate the parameters of the model based on available data from the process, using techniques such as regression analysis, least squares, or maximum likelihood estimation.	1	2	2	-
PC11. Develop control strategies to regulate the process variables and maintain them within desired operating conditions.	1	3	3	-
PC12. Apply optimization techniques, such as linear programming, dynamic programming, or genetic algorithms, to minimize costs, maximize throughput, or improve overall process efficiency.	2	3	3	-
NOS Total	**15**	**30**	**30**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9835
NOS Name	Applied Mathematics
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Generic
NSQF Level	3.5
Credits	3
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N3622: Engine Assembly

Description

This NOS is about performing assembly of engine and its components like Engine Blocks, Cylinders, Piston Rod, Crankshaft and Camshaft components.

Scope

The scope covers the following :

- Inspect and Prepare Components for Assembly
- Perform pre-assembly activities
- Conduct the assembly operation
- Conduct the post-assembly operations

Elements and Performance Criteria

Inspect and Prepare Components for Assembly

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

PC1. Inspect engine components for quality and completeness

PC2. Prepare components for assembly by cleaning, lubricating, and organizing as needed

PC3. Verify that all necessary parts and materials are available for assembly

Perform pre-assembly activities

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

PC4. check and clean the assembling equipment of any dust and impurities

PC5. fill CLRI (Clean, lubricate, retighten & inspection) check sheet and report to the supervisor about any abnormalities identified and action taken to resolve them

PC6. setup the equipment required as per the selected assembling method

PC7. ensure that the right programme is selected in case of robotic assembly method as defined in the SOP

PC8. lift the auto component manually or by hoist and place the same securely on the designated slot/space as indicated in the drawing/work instructions

PC9. inspect and mark the defects if any, such as in paint, dents, grooves, cracks, rough edges etc. on the physical body of the auto component

PC10. check all the semi-precision mechanical, pneumatic, hydraulic and electrical parts in the auto components by using the correct methodology as indicated in the Work Instructions/SOPs

PC11. check adhesion of roof-lining, insulation material, roof-rail etc. of the auto component

Conduct the assembly operation

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

PC12. perform assembly operation and assemble the safety parts i.e. bearings, shafts, Gaskets, Seal etc.,

PC13. perform installation of the Oil and Lube systems by placing and fitting the funnel, filters, hose pipes, glands, sockets, suction guns and regulator valves as prescribed in the Work Instructions/ SOPs/Control Plans

PC14. carry out sealing of the required areas to prevent any leakage of water/air etc. during the usage of the component

PC15. carry out labeling on the auto components specifying the information related to assembly process and quality norms followed

Conduct the post-assembly operations

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

PC16. apply appropriate lubricant on the component as per manufacturer's specifications

PC17. check and confirm that water, diesel or petrol, brake oil, gear oil, engine oil etc. are filled as per the required volume and type

PC18. check the assembled auto components as per the control plan, work instructions for product quality

PC19. dispose scrap or waste material into the disposal area in accordance with the company's policies and environmental regulations

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. various components and systems of a vehicle

KU3. various assembly operations and methods

KU4. the process flow of the assembly operations

KU5. SOP recommended by the manufacturer for using hand tools, measuring instruments and equipments required during the assembly process

KU6. Engine Design and Function: A thorough understanding of the engine's design, purpose, and operating principles is crucial for assembling it correctly. This includes knowledge of the various components, their functions, and how they interact within the engine system.

KU7. Blueprint Reading: The ability to read and interpret engineering drawings, assembly instructions, and specifications is vital for assembling an engine accurately. This includes understanding dimensions, tolerances, and assembly sequences.

KU8. Material Properties: Knowledge of the materials used in engine components, such as metals, plastics, and rubber, is essential for understanding their properties, limitations, and proper handling during assembly.

KU9. Tolerances and Clearances: Understanding the importance of maintaining proper tolerances and clearances between engine components is crucial for ensuring smooth operation and preventing wear and tear.

KU10. Tool Usage and Maintenance: Familiarity with various tools and equipment required for engine assembly, such as wrenches, torque wrenches, calipers, and alignment tools, is necessary for efficient and accurate work.

KU11. Fastener Knowledge: Knowledge of different types of fasteners, their applications, and proper installation techniques is essential for ensuring the structural integrity and longevity of engine components.

Generic Skills (GS)

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

GS1. read and interpret drawings, work instructions, equipment manuals and process documents

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

GS3. communicate issues to the supervisor that occur during assembling process

GS4. attentively listen and comprehend the information given by the lead technician/team members

GS5. write any work related information in English/regional language

GS6. recognise a workplace problem and take suitable action

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

GS8. plan and organise work according to the principles of 5S

GS9. complete the assigned tasks with minimum supervision

GS10. report to the supervisor or deal with a colleague individually, depending on the type of concern

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Inspect and Prepare Components for Assembly	**3**	**6**	**6**	**-**
PC1. Inspect engine components for quality and completeness	1	2	2	-
PC2. Prepare components for assembly by cleaning, lubricating, and organizing as needed	1	2	2	-
PC3. Verify that all necessary parts and materials are available for assembly	1	2	2	-
Perform pre-assembly activities	**5**	**14**	**14**	**-**
PC4. check and clean the assembling equipment of any dust and impurities	1	2	2	-
PC5. fill CLRI (Clean, lubricate, retighten & inspection) check sheet and report to the supervisor about any abnormalities identified and action taken to resolve them	1	2	2	-
PC6. setup the equipment required as per the selected assembling method	1	2	2	-
PC7. ensure that the right programme is selected in case of robotic assembly method as defined in the SOP	1	-	-	-
PC8. lift the auto component manually or by hoist and place the same securely on the designated slot/space as indicated in the drawing/work instructions	1	2	2	-
PC9. inspect and mark the defects if any, such as in paint, dents, grooves, cracks, rough edges etc. on the physical body of the auto component	-	2	2	-
PC10. check all the semi-precision mechanical, pneumatic, hydraulic and electrical parts in the auto components by using the correct methodology as indicated in the Work Instructions/SOPs	-	2	2	-
PC11. check adhesion of roof-lining, insulation material, roof-rail etc. of the auto component	-	2	2	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Conduct the assembly operation	**5**	**5**	**5**	**-**
PC12. perform assembly operation and assemble the safety parts i.e. bearings, shafts, Gaskets, Seal etc.,	1	1	1	-
PC13. perform installation of the Oil and Lube systems by placing and fitting the funnel, filters, hose pipes, glands, sockets, suction guns and regulator valves as prescribed in the Work Instructions/ SOPs/Control Plans	2	1	1	-
PC14. carry out sealing of the required areas to prevent any leakage of water/air etc. during the usage of the component	1	2	2	-
PC15. carry out labeling on the auto components specifying the information related to assembly process and quality norms followed	1	1	1	-
Conduct the post-assembly operations	**2**	**5**	**5**	**-**
PC16. apply appropriate lubricant on the component as per manufacturer's specifications	1	2	2	-
PC17. check and confirm that water, diesel or petrol, brake oil, gear oil, engine oil etc. are filled as per the required volume and type	1	1	1	-
PC18. check the assembled auto components as per the control plan, work instructions for product quality	-	1	1	-
PC19. dispose scrap or waste material into the disposal area in accordance with the company's policies and environmental regulations	-	1	1	-
NOS Total	**15**	**30**	**30**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3622
NOS Name	Engine Assembly
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Assembly Operation
NSQF Level	3.5
Credits	3
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N3623: Vehicle Assembly

Description

This NOS is about performing assembly of vehicle, and its components like fuel system, transmission system, braking, steering, electrical and electronic components, aesthetic parts, seating arrangements etc.

Scope

The scope covers the following :

- Inspect and Prepare Components for Assembly
- Perform Vehicle pre-assembly activities
- Conduct the assembly operation
- Conduct the post-assembly operations

Elements and Performance Criteria

Inspect and Prepare Components for Assembly

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

PC1. Inspect vehicle components for quality and completeness

PC2. Prepare components for assembly by cleaning, lubricating, and organizing as needed

PC3. Verify that all necessary parts and materials are available for assembly

Perform Vehicle pre-assembly activities

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

PC4. check and clean the assembling equipment of any dust and impurities

PC5. fill CLRI (Clean, lubricate, retighten & inspection) check sheet and report to the supervisor about any abnormalities identified and action taken to resolve them

PC6. setup the equipment required as per the selected assembling method

PC7. • ensure that the right programme is selected in case of robotic assembly method as defined • in the SOP

PC8. lift the auto component manually or by hoist and place the same securely on the designated slot/space as indicated in the drawing/work instructions

PC9. inspect and mark the defects if any, such as in paint, dents, grooves, cracks, rough edges etc. on the physical body of the auto component

PC10. check all the semi-precision mechanical, pneumatic, hydraulic and electrical parts in the auto components by using the correct methodology as indicated in the Work Instructions/SOPs

PC11. check adhesion of roof-lining, insulation material, roof-rail etc. of the auto component

Conduct the assembly operation

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

PC12. perform assembly operation and assemble the safety parts i.e. bearings, shafts etc., electrical semi-precision parts such as electric wire harness, Electronic Control Unit (ECU), automatic lock system, fuel injection system and other similar parts

PC13. perform installation of the Oil and Lube systems by placing and fitting the funnel, filters, hose pipes, glands, sockets, suction guns and regulator valves as prescribed in the Work Instructions/ SOPs/Control Plans

PC14. carry out sealing of the required areas to prevent any leakage of water/air etc. during the usage of the component

PC15. carry out labeling on the auto components specifying the information related to assembly process and quality norms followed

Conduct the post-assembly operations

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

PC16. apply appropriate lubricant on the component as per manufacturer's specifications

PC17. check and confirm that water, diesel or petrol, brake oil, gear oil, engine oil etc. are filled as per the required volume and type

PC18. check the assembled auto components as per the control plan, work instructions for product quality

PC19. dispose scrap or waste material into the disposal area in accordance with the company's policies and environmental regulations

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. various components and systems of a vehicle

KU3. various assembly operations and methods

KU4. the process flow of the assembly operations

KU5. SOP recommended by the manufacturer for using hand tools, measuring instruments and equipments required during the assembly process

KU6. Assembly Process Knowledge: Understanding the overall vehicle assembly process, including the sequence of operations, tools, and equipment required for each stage.

KU7. Blueprint Reading: Ability to read and interpret assembly drawings, schematics, and work instructions to ensure proper assembly of components and systems

KU8. Tools and Equipment: Knowledge of various tools and equipment used in the assembly process, such as wrenches, screwdrivers, torque guns, and pneumatic or hydraulic presses

KU9. Quality Control: Understanding the importance of quality control and the ability to identify and rectify any defects or inconsistencies during the assembly process

KU10. Material Handling: Knowledge of proper material handling techniques and safety precautions to prevent damage to components and ensure worker safety

KU11. Fastening Techniques: Understanding different fastening techniques, such as bolting, riveting, welding, and adhesive bonding, and selecting the appropriate method for specific applications.

KU12. Electrical and Electronic Systems: Knowledge of electrical and electronic systems in vehicles, including wiring harnesses, connectors, sensors, and control units, and their proper installation.

Generic Skills (GS)

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

GS1. read and interpret drawings, work instructions, equipment manuals and process documents

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

GS3. communicate issues to the supervisor that occur during assembling process

GS4. attentively listen and comprehend the information given by the lead technician/team members

GS5. write any work related information in English/regional language

GS6. recognise a workplace problem and take suitable action

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

GS8. plan and organise work according to the principles of 5S

GS9. complete the assigned tasks with minimum supervision

GS10. report to the supervisor or deal with a colleague individually, depending on the type of concern

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Inspect and Prepare Components for Assembly	**3**	**6**	**6**	**-**
PC1. Inspect vehicle components for quality and completeness	1	2	2	-
PC2. Prepare components for assembly by cleaning, lubricating, and organizing as needed	1	2	2	-
PC3. Verify that all necessary parts and materials are available for assembly	1	2	2	-
Perform Vehicle pre-assembly activities	**5**	**14**	**14**	**-**
PC4. check and clean the assembling equipment of any dust and impurities	1	2	2	-
PC5. fill CLRI (Clean, lubricate, retighten & inspection) check sheet and report to the supervisor about any abnormalities identified and action taken to resolve them	1	2	2	-
PC6. setup the equipment required as per the selected assembling method	1	2	2	-
PC7. • ensure that the right programme is selected in case of robotic assembly method as defined • in the SOP	1	-	-	-
PC8. lift the auto component manually or by hoist and place the same securely on the designated slot/space as indicated in the drawing/work instructions	1	2	2	-
PC9. inspect and mark the defects if any, such as in paint, dents, grooves, cracks, rough edges etc. on the physical body of the auto component	-	2	2	-
PC10. check all the semi-precision mechanical, pneumatic, hydraulic and electrical parts in the auto components by using the correct methodology as indicated in the Work Instructions/SOPs	-	2	2	-
PC11. check adhesion of roof-lining, insulation material, roof-rail etc. of the auto component	-	2	2	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Conduct the assembly operation	**5**	**5**	**5**	**-**
PC12. perform assembly operation and assemble the safety parts i.e. bearings, shafts etc., electrical semi-precision parts such as electric wire harness, Electronic Control Unit (ECU), automatic lock system, fuel injection system and other similar parts	1	1	1	-
PC13. perform installation of the Oil and Lube systems by placing and fitting the funnel, filters, hose pipes, glands, sockets, suction guns and regulator valves as prescribed in the Work Instructions/ SOPs/Control Plans	2	1	1	-
PC14. carry out sealing of the required areas to prevent any leakage of water/air etc. during the usage of the component	1	2	2	-
PC15. carry out labeling on the auto components specifying the information related to assembly process and quality norms followed	1	1	1	-
Conduct the post-assembly operations	**2**	**5**	**5**	**-**
PC16. apply appropriate lubricant on the component as per manufacturer's specifications	1	2	2	-
PC17. check and confirm that water, diesel or petrol, brake oil, gear oil, engine oil etc. are filled as per the required volume and type	1	1	1	-
PC18. check the assembled auto components as per the control plan, work instructions for product quality	-	1	1	-
PC19. dispose scrap or waste material into the disposal area in accordance with the company's policies and environmental regulations	-	1	1	-
NOS Total	**15**	**30**	**30**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3623
NOS Name	Vehicle Assembly
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Assembly Operation
NSQF Level	3.5
Credits	3
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N6112: Exports and Packaging

Description

This NOS is about to Perform Exports and Packaging in Machining and Assembly.

Scope

The scope covers the following :

- Inspect the machined components and assembled products to ensure they meet the required specifications.
- Develop appropriate packaging designs that protect the products from potential damages.
- Carefully pack the machined components or assembled products using the selected materials
- Ensure that the exported products adhere to all relevant regulatory requirement.

Elements and Performance Criteria

Inspect the machined components and assembled products to ensure they meet the required specifications

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

PC1. Develop and implement quality control procedures to inspect machined components and assembled products, ensuring they meet the specified tolerances, dimensions, and surface finishes.

PC2. Apply non-destructive testing techniques, like magnetic particle inspection, dye penetrant testing, or ultrasonic testing, to detect defects or anomalies in the machined components without damaging them

PC3. Maintain accurate records of inspection results, including measurements, defects found, and corrective actions taken, to ensure traceability and compliance with quality standards.

Develop appropriate packaging designs that protect the products from potential damages

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

PC4. Identify potential hazards and damages that the product may face during transit, such as vibrations, shocks, temperature fluctuations, and humidity changes, and design packaging to mitigate these risks.

PC5. Choose appropriate packaging materials based on factors like cost, availability, environmental impact, and performance, such as corrugated cardboard, foam, bubble wrap, or plastic films.

PC6. Develop packaging designs that effectively protect the product from potential damages

PC7. Arrange the product within the packaging to minimize movement and prevent damage during transportation.

Carefully pack the machined components or assembled products using the selected materials

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

PC8. Evaluate the size, shape, weight, and fragility of the machined components or assembled products to determine the appropriate packaging materials and methods.

PC9. Choose suitable packaging materials, such as corrugated cardboard, foam, bubble wrap, or protective films, based on the product's requirements

PC10. Arrange the components or products within the packaging in a manner that ensures even distribution of forces, minimizes contact between parts

PC11. Securely close and seal the packaging, using appropriate methods like taping, strapping, or adhesives, to ensure the contents remain protected during transit and storage

Ensure that the exported products adhere to all relevant regulatory requirement

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

PC12. Develop and maintain comprehensive documentation related to regulatory compliance, including certificates of conformity, technical specifications, and safety manuals

PC13. Implement and maintain a robust QMS that ensures consistent quality and compliance across all stages of production

PC14. Perform necessary tests and obtain relevant certifications to demonstrate that the products meet the required safety, environmental, and performance standards

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. various components and systems of a vehicle

KU3. various assembly operations and methods

KU4. the process flow of the assembly operations

KU5. Regulatory Compliance: Familiarity with the relevant export and import laws, trade agreements, and product safety standards of the countries involved in the export process. This includes understanding customs procedures, documentation requirements, and potential restrictions or barriers.

KU6. Quality Management: Understanding of quality management systems (QMS), such as ISO 9001, and the ability to implement and maintain processes that ensure consistent quality and compliance throughout the production, packaging, and shipping stages.

KU7. Packaging Principles: Knowledge of appropriate packaging materials, techniques, and standards to protect the products during transportation and ensure they arrive at their destination in good condition. This includes understanding the principles of secure packing, handling, and labeling.

KU8. Labeling and Marking Requirements: Ability to identify and adhere to labeling and marking requirements for exported products, including information about the product's origin, materials, safety instructions, and regulatory compliance.

KU9. Customs Procedures: Knowledge of customs clearance processes, including the necessary documentation, taxes, and duties associated with exporting products to different countries.

KU10. Supply Chain Management: Understanding of supply chain management principles and their impact on the export and packaging process, including inventory management, logistics, and transportation.

Generic Skills (GS)

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

GS1. read and interpret drawings, work instructions, equipment manuals and process documents

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

GS3. communicate issues to the supervisor that occur during assembling process

GS4. attentively listen and comprehend the information given by the lead technician/team members

GS5. write any work related information in English/regional language

GS6. recognise a workplace problem and take suitable action

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

GS8. plan and organise work according to the principles of 5S

GS9. complete the assigned tasks with minimum supervision

GS10. report to the supervisor or deal with a colleague individually, depending on the type of concern

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Inspect the machined components and assembled products to ensure they meet the required specifications	**3**	**6**	**6**	**-**
PC1. Develop and implement quality control procedures to inspect machined components and assembled products, ensuring they meet the specified tolerances, dimensions, and surface finishes.	1	2	2	-
PC2. Apply non-destructive testing techniques, like magnetic particle inspection, dye penetrant testing, or ultrasonic testing, to detect defects or anomalies in the machined components without damaging them	1	2	2	-
PC3. Maintain accurate records of inspection results, including measurements, defects found, and corrective actions taken, to ensure traceability and compliance with quality standards.	1	2	2	-
Develop appropriate packaging designs that protect the products from potential damages	**5**	**12**	**12**	**-**
PC4. Identify potential hazards and damages that the product may face during transit, such as vibrations, shocks, temperature fluctuations, and humidity changes, and design packaging to mitigate these risks.	1	3	3	-
PC5. Choose appropriate packaging materials based on factors like cost, availability, environmental impact, and performance, such as corrugated cardboard, foam, bubble wrap, or plastic films.	1	3	3	-
PC6. Develop packaging designs that effectively protect the product from potential damages	1	3	3	-
PC7. Arrange the product within the packaging to minimize movement and prevent damage during transportation.	2	3	3	-
Carefully pack the machined components or assembled products using the selected materials	**5**	**8**	**8**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC8. Evaluate the size, shape, weight, and fragility of the machined components or assembled products to determine the appropriate packaging materials and methods.	1	2	2	-
PC9. Choose suitable packaging materials, such as corrugated cardboard, foam, bubble wrap, or protective films, based on the product's requirements	2	2	2	-
PC10. Arrange the components or products within the packaging in a manner that ensures even distribution of forces, minimizes contact between parts	1	2	2	-
PC11. Securely close and seal the packaging, using appropriate methods like taping, strapping, or adhesives, to ensure the contents remain protected during transit and storage	1	2	2	-
Ensure that the exported products adhere to all relevant regulatory requirement	**2**	**4**	**4**	**-**
PC12. Develop and maintain comprehensive documentation related to regulatory compliance, including certificates of conformity, technical specifications, and safety manuals	1	2	2	-
PC13. Implement and maintain a robust QMS that ensures consistent quality and compliance across all stages of production	1	1	1	-
PC14. Perform necessary tests and obtain relevant certifications to demonstrate that the products meet the required safety, environmental, and performance standards	-	1	1	-
NOS Total	**15**	**30**	**30**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6112
NOS Name	Exports and Packaging
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Supply Chain Management
NSQF Level	3.5
Credits	3
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

ASC/N6113: Forklift Driving

Description

This NOS is about to Operate a forklift in assembling parts and maintaining equipment

Scope

The scope covers the following :

- Conduct a pre-operation inspection of the forklift.
- Safely operate the forklift to transport materials.
- Perform routine maintenance tasks.

Elements and Performance Criteria

Conduct a pre-operation inspection of the forklift

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

PC1. examine the forklift's exterior, including the body, forks, tires, and undercarriage, for any visible damage, wear, or signs of corrosion

PC2. Verify the appropriate fluid levels, such as engine oil, coolant, hydraulic fluid, and fuel, ensuring they are within the recommended range.

PC3. Verify the proper functioning of safety features, such as seatbelts, backup alarms, and load backrests

Safely operate the forklift to transport materials

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

PC4. Conduct a thorough inspection of the forklift before starting any operation. Check tire pressure, fluid levels, brakes, steering, and safety features to ensure the forklift is in good working condition

PC5. Put on necessary safety gear, such as a hard hat, safety shoes, high-visibility vest, and safety glasses, to protect yourself during operation

PC6. Adhere to safety protocols, such as maintaining a safe speed, using warning signals, and following designated routes within the workplace

PC7. Determine the most efficient and safest route to transport materials, considering factors like aisle width, obstacles, and other equipment or personnel in the area

Perform routine maintenance tasks

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

PC8. Conduct a daily inspection of the forklift, checking tires, fluids, brakes, steering, and safety features to ensure it is in good working condition

PC9. Monitor and maintain proper fluid levels, including engine oil, coolant, brake fluid, and hydraulic fluid

PC10. ensure electric forklifts are charged and batteries are in good condition. Replace or maintain batteries as required and follow the manufacturer's guidelines for charging cycles.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. various components and systems of a vehicle

KU3. various assembly operations and methods

KU4. the process flow of the assembly operations

KU5. Forklift Operation: Proficiency in operating various types of forklifts, such as electric, gas, or diesel-powered forklifts, and understanding their controls, capacities, and safety features.

KU6. Load Handling: Ability to safely and efficiently handle different types of loads, including understanding load weight and center of gravity, proper stacking techniques, and load securement methods.

KU7. Workplace Safety: Knowledge of safety guidelines and protocols, such as OSHA (Occupational Safety and Health Administration) standards, to prevent accidents and ensure a safe working environment.

KU8. Warehouse Layout and Navigation: Understanding of warehouse layouts, including aisles, racking systems, and storage locations, to efficiently transport materials and assemble parts.

KU9. Maintenance and Inspection: Knowledge of regular forklift maintenance procedures, including daily inspections, refueling or charging, and scheduled maintenance tasks. Understanding the importance of timely repairs and reporting any malfunctions or issues to the appropriate personnel.

Generic Skills (GS)

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

GS1. read and interpret drawings, work instructions, equipment manuals and process documents

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

GS3. communicate issues to the supervisor that occur during assembling process

GS4. attentively listen and comprehend the information given by the lead technician/team members

GS5. write any work related information in English/regional language

GS6. recognise a workplace problem and take suitable action

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

GS8. plan and organise work according to the principles of 5S

GS9. complete the assigned tasks with minimum supervision

GS10. report to the supervisor or deal with a colleague individually, depending on the type of concern

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Conduct a pre-operation inspection of the forklift	**5**	**10**	**10**	**-**
PC1. examine the forklift's exterior, including the body, forks, tires, and undercarriage, for any visible damage, wear, or signs of corrosion	1	2	2	-
PC2. Verify the appropriate fluid levels, such as engine oil, coolant, hydraulic fluid, and fuel, ensuring they are within the recommended range.	2	4	4	-
PC3. Verify the proper functioning of safety features, such as seatbelts, backup alarms, and load backrests	2	4	4	-
Safely operate the forklift to transport materials	**5**	**10**	**10**	**-**
PC4. Conduct a thorough inspection of the forklift before starting any operation. Check tire pressure, fluid levels, brakes, steering, and safety features to ensure the forklift is in good working condition	1	2	2	-
PC5. Put on necessary safety gear, such as a hard hat, safety shoes, high-visibility vest, and safety glasses, to protect yourself during operation	2	3	3	-
PC6. Adhere to safety protocols, such as maintaining a safe speed, using warning signals, and following designated routes within the workplace	1	2	2	-
PC7. Determine the most efficient and safest route to transport materials, considering factors like aisle width, obstacles, and other equipment or personnel in the area	1	3	3	-
Perform routine maintenance tasks	**5**	**10**	**10**	**-**
PC8. Conduct a daily inspection of the forklift, checking tires, fluids, brakes, steering, and safety features to ensure it is in good working condition	1	2	2	-
PC9. Monitor and maintain proper fluid levels, including engine oil, coolant, brake fluid, and hydraulic fluid	2	4	4	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. ensure electric forklifts are charged and batteries are in good condition. Replace or maintain batteries as required and follow the manufacturer's guidelines for charging cycles.	2	4	4	-
NOS Total	**15**	**30**	**30**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6113
NOS Name	Forklift Driving
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Supply Chain Management
NSQF Level	3.5
Credits	3
Version	1.0
Last Reviewed Date	30/11/2023
Next Review Date	30/11/2026
NSQC Clearance Date	30/11/2023

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

Assessment Plan:

1. Components of Assessment: - Each subject will be assessed in three components: Theory (20% weightage), Practical (40% weightage), and On-job Training (OJT, 40% weightage).

2. Passing Parameters: - To pass the semester, students must meet both the assessment parameters given below.

Parameter 1 - Weighted Semester Score: - Students must achieve a minimum of 60% in the weighted average score across all three components (Theory, Practical, and OJT) for each subject.

Parameter 2 - Individual Component Score: - Students need to score at least 40% in each individual component (Theory, Practical, and OJT) of every subject.

Mandatory Note: This qualification can be offered as part of a Diploma program, in line with the 39th NSQC, ASDC Diploma (Diploma in Manufacturing Technology) approval. However, achieving 40 credits in a year is mandatory for progression within the Diploma course. Therefore, it is required to select at least one

optional NOS in every semester to meet this requirement.

Minimum Aggregate Passing % at QP Level : 40

(**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/N6314.Metrology (Measurement)	20	40	40	0	100	15
ASC/N3545.Workshop Technology	20	40	40	0	100	15
ASC/N6458.Engineering Drawing	20	40	40	0	100	15
DGT/VSQ/N0104.Employability Skills (120 Hours)	20	30	-	-	50	5
ASC/N9833.Industrial Safety	15	30	30	-	75	5
ASC/N3546.Machining Skills-Drilling ,Milling & Turning	20	40	40	-	100	15
ASC/N3547.Machining Skills-CNC Milling	20	40	40	-	100	15
ASC/N3548.Machining Skills-CNC Turning	20	40	40	-	100	10
ASC/N9835.Applied Mathematics	15	30	30	-	75	5
Total	**170**	**330**	**300**	**-**	**800**	**100**

Optional: 1 Semester-1: Engine Assembly

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N3622.Engine Assembly	15	30	30	-	75	10
Total	**15**	**30**	**30**	**-**	**75**	**10**

Optional: 2 Semester 1: Vehicle Assembly

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N3623.Vehicle Assembly	15	30	30	-	75	10
Total	**15**	**30**	**30**	**-**	**75**	**10**

Optional: 3 Semester-2: Exports and Packaging

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N6112.Exports and Packaging	15	30	30	-	75	10
Total	**15**	**30**	**30**	**-**	**75**	**10**

Optional: 4 Semester-2: Forklift Driving

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N6113.Forklift Driving	15	30	30	-	75	10
Total	**15**	**30**	**30**	**-**	**75**	**10**

Acronyms

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

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.