Qualification Pack

Automotive Welding Simulation Trainee (using AR)

Robotic Welding/ Advanced Welding Mastery

QP Code: ASC/Q3112

Version: 1.0

NSQF Level: 4

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Qualification Pack

ASC/Q3112: Automotive Welding Simulation Trainee (using AR)

Brief Job Description

An augmented reality (AR) welding technician uses AR technology to learn, practice, and refine welding skills. An AR welding technician primarily uses augmented reality technology to perform welding process by visualizing weld paths, inspecting welds in real-time, and ensuring accuracy by overlaying digital information onto the physical work area, while still performing the core responsibilities of a traditional welder, such as preparing materials, setting up welding equipment, and executing various welding techniques.

Personal Attributes

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

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. ASC/N9803: Organize work and resources (Manufacturing)
2. DGT/VSQ/N0101: Employability Skills (30 Hours)
3. ASC/N3129: Perform SMAW welding using AR technology
4. ASC/N3130: Perform GMAW welding using AR technology
5. ASC/N3131: Perform GTAW welding using AR technology

Options*(Not mandatory):*

Option 1: Robotic Welding

1. ASC/N3132: Perform robotic welding using AR technology

Option 2: Advanced Welding Mastery

1. ASC/N3133: Advanced Automotive Welding Mastery

Qualification Pack

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Metal Joining
Country	India
NSQF Level	4
Credits	24
Aligned to NCO/ISCO/ISIC Code	7212.0303
Minimum Educational Qualification & Experience	12th grade Pass OR 10th Class with 3 Years of experience Welding/ AR/VR Simulation OR Certificate-NSQF (Level 3) with 3 Years of experience
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	08/05/2028
NSQC Approval Date	08/05/2025
Version	1.0
Reference code on NQR	QG-04-AU-04195-2025-V1-ASDC
NQR Version	1.0

ASC/N9803: Organize work and resources (Manufacturing)

Description

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

Scope

The scope covers the following :

- Maintain safe and secure working environment
- Health and hygiene
- Perform work as per quality standards
- Effective waste management practices
- Material/energy conservation practices

Elements and Performance Criteria

Maintain safe and secure working environment

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

PC1. identify hazardous activities and the possible causes of risks or accidents in the workplace

PC2. follow safe working practices while dealing with hazards to ensure safety of self and others

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

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

PC5. follow safety hazards and preventive techniques during fire drill

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

Health and hygiene

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

PC7. ensure workstation and equipment are regularly clean and sanitized

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

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

PC10. wear and dispose PPEs regularly and appropriately

PC11. report advanced hygiene and sanitation issues to appropriate authority

PC12. follow stress and anxiety management techniques

Perform work as per quality standards

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

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

PC14. ensure team goals are given preference over individual goals

Effective waste management practices

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

PC15. follow the fundamentals of 5S for waste management

PC16. segregate waste into different categories

PC17. follow processes specified for disposal of hazardous waste

PC18. identify recyclable, non-recyclable and hazardous waste

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

Material/energy conservation practices

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

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

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

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

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

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

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

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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

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

KU3. evacuation procedures for workers and visitors

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

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

KU6. preventative and remedial actions to be taken in case of exposure to toxic material

KU7. various types of fire extinguisher

KU8. various types of safety signs and their meaning

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

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

KU11. the various materials used and their storage norms

KU12. efficient utilisation of material and water

KU13. basics of electricity and prevalent energy efficient devices

KU14. common practices of conserving electricity

KU15. common sources and ways to minimize pollution

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

KU17. usage of different colors of dustbins

KU18. waste management techniques
KU19. significance of greening

Generic Skills (GS)

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

GS1. read safety instructions/guidelines
GS2. modify work practices to improve them
GS3. ask for clarifications from superior about the job requirement
GS4. work with supervisors/team members to carry out work related tasks
GS5. complete tasks efficiently and accurately within stipulated time
GS6. inform/report to concerned person in case of any problem
GS7. make timely decisions for efficient utilization of resources
GS8. write reports such as accident report, in at least English/regional language
GS9. be punctual and utilize time efficiently

Assessment Criteria

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

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

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N9803
NOS Name	Organize work and resources (Manufacturing)
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	3
Credits	1.5
Version	3.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

DGT/VSQ/N0101: Employability Skills (30 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
- 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 job requirements

Constitutional values – Citizenship

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

PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

Becoming a Professional in the 21st Century

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

PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

Basic English Skills

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

PC4. speak with others using some basic English phrases or sentences

Communication Skills

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

PC5. follow good manners while communicating with others

PC6. work with others in a team

Diversity & Inclusion

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

PC7. communicate and behave appropriately with all genders and PwD

PC8. report any issues related to sexual harassment

Financial and Legal Literacy

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

PC9. use various financial products and services safely and securely

PC10. calculate income, expenses, savings etc.

PC11. approach the concerned authorities for any exploitation as per legal rights and laws

Essential Digital Skills

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

PC12. operate digital devices and use its features and applications securely and safely

PC13. use internet and social media platforms securely and safely

Entrepreneurship

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

PC14. identify and assess opportunities for potential business

PC15. identify sources for arranging money and associated financial and legal challenges

Customer Service

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

PC16. identify different types of customers

PC17. identify customer needs and address them appropriately

PC18. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

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

PC19. create a basic biodata

PC20. search for suitable jobs and apply

PC21. identify and register apprenticeship opportunities as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

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

KU5. how to use basic spoken English language

KU6. Do and dont of effective communication

KU7. inclusivity and its importance

KU8. different types of disabilities and appropriate communication and behaviour towards PwD

KU9. different types of financial products and services

KU10. how to compute income and expenses
KU11. importance of maintaining safety and security in financial transactions
KU12. different legal rights and laws
KU13. how to operate digital devices and applications safely and securely
KU14. ways to identify business opportunities
KU15. types of customers and their needs
KU16. how to apply for a job and prepare for an interview
KU17. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

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

GS1. communicate effectively using appropriate language
GS2. behave politely and appropriately with all
GS3. perform basic calculations
GS4. solve problems effectively
GS5. be careful and attentive at work
GS6. use time effectively
GS7. maintain hygiene and sanitisation 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 job requirements	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**1**	**3**	**-**	**-**
PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC4. speak with others using some basic English phrases or sentences	-	-	-	-
Communication Skills	**1**	**1**	**-**	**-**
PC5. follow good manners while communicating with others	-	-	-	-
PC6. work with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**1**	**-**	**-**
PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC8. report any issues related to sexual harassment	-	-	-	-
Financial and Legal Literacy	**3**	**4**	**-**	**-**
PC9. use various financial products and services safely and securely	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. calculate income, expenses, savings etc.	-	-	-	-
PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
Essential Digital Skills	**4**	**6**	**-**	**-**
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
Entrepreneurship	**3**	**5**	**-**	**-**
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
Customer Service	**2**	**2**	**-**	**-**
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**1**	**3**	**-**	**-**
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0101
NOS Name	Employability Skills (30 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	2
Credits	1
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

ASC/N3129: Perform SMAW welding using AR technology

Description

This NOS unit is about performing SMAW activities and post-welding operations by utilizing augmented reality technology as per the given work order and the standards specified by the organization.

Scope

The scope covers the following :

- Prepare for SMAW operations
- Perform SMAW using AR technology
- Perform post-welding operations

Elements and Performance Criteria

Prepare for SMAW operations

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

PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders

PC2. identify welding requirements including relevant standards and codes from drawings, specifications and other customer and enterprise documentation

PC3. identify and arrange the AR system and simulator, tools, welding machines, measuring instruments, accessories, consumables and input materials (MS and SS plates) as per the requirements mentioned in WPS

PC4. check that material to be welded is as per the required specifications, quality and job requirement

PC5. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues

PC6. ensure that the AR software and applications used for welding are up-to-date, including any necessary calibration or firmware updates

PC7. calibrate AR devices to maintain accuracy in the overlayed instructions and welding parameters

PC8. plan the welding activities before starting the actual process as per WPS

PC9. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario

PC10. set up virtual welding scenarios related to vehicle parts welding such as indoor or outdoor welding, different positions (flat, horizontal, vertical), and the materials to be welded

PC11. follow appropriate safety practices as specified by organization during the work

Perform SMAW using AR technology

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

PC12. prepare the workpiece and materials for welding by cleaning, grinding, and positioning them according to project specification and the chosen welding scenario

PC13. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements

PC14. adjust the settings of the welding machine (e.g., amperage, voltage) to match the simulation

PC15. ensure that electrodes distance, contact area, pressure, application etc. are maintained as specified in Work Instructions (WI)

PC16. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process

PC17. perform SMAW tasks while utilizing the AR guidance for precision and quality control

PC18. use AR overlays to accurately position welds, identify critical areas, and ensure proper joint alignment

PC19. confirm weld to be performed as per the job plan and specifications

PC20. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation

PC21. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)

PC22. follow AR system suggestions (if any) for corrections in case of arc is too long or too short, user is moving too fast or slow etc. to maintain an optimal arc length

PC23. produce joints of the specified dimensional accuracy and required weld quality

PC24. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing

PC25. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece

Perform post-welding operations

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

PC26. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations

PC27. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.

PC28. conduct destructive and non-destructive tests on the work pieces

PC29. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category

PC30. tag and store the right quality pieces by following organisational policies and procedures

PC31. clean and store all the tools, machine and equipment after completion of work

PC32. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations

PC33. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits

PC34. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company
KU2. occupational health and safety in welding
KU3. basics of Welding (including types of joint and welding symbols)
KU4. overview of SMAW process
KU5. SMAW and its process flow
KU6. overview of AR technology and its use in welding processes
KU7. applications of AR welding in automotive industry
KU8. various types of welding joints i.e. fillet lap joints, tee fillet joints, corner joints, butt joints (square, single, vee, double vee)
KU9. various welding positions i.e. flat (PA) IG/1F, horizontal vertical (PB)2F, horizontal (PC)2G, vertical upwards (PF) 3F / 3G, vertical downwards (PG) 3F / 3G, Plate to Pipe (Fixed) 5F
KU10. how to read and interpret WPS, welding drawings and symbols
KU11. welding specific equipment requirements for SMAW
KU12. concept of weldability and selection of filler wires and shielding gases
KU13. safe welding practices and procedures and use of personal protective equipment (PPE)
KU14. different current and voltage settings, gas flow rates wire diameters, wire feed speed and other variables to suit typical situations
KU15. material and equipment preparation
KU16. properties and characteristics of materials and consumables
KU17. impact of various welding parameters like voltage, current, gas flow rate, speed, pressure, torch angle, cycle time, electrode distance etc. on the quality and quantity of welding
KU18. relationship between wire feed, speed control and welding current
KU19. SOP recommended by the organisation for SAMW using AR technology
KU20. types, selection and application of filler wires and welding electrodes
KU21. shielding gas properties and applications
KU22. types of beads, characteristics and uses (stringer, weave, weave patterns)
KU23. post-welding treatments
KU24. control of stress and distortion in welding
KU25. quality control and defect analysis of welded piece by using AR technology
KU26. SOP recommended by the organisation for checking irregularities in the product/work piece
KU27. factors that affect weld quality standards
KU28. various defects associated with the SMAW process
KU29. how to control distortion (such as welding sequence, deposition technique)
KU30. various testing techniques like visual, destructive and non-destructive
KU31. safety requirements during the welding work

Generic Skills (GS)

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

GS1. read work instructions, equipment manuals and process documents
GS2. communicate the process requirements to the supervisor and co-workers

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

GS4. write work related information in English/regional language

GS5. recognise a workplace problem and take suitable action

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

GS7. plan and organise work according to the work requirements

GS8. complete the assigned tasks with minimum supervision

GS9. 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
Prepare for SMAW operations	**10**	**16**	**-**	**6**
PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders	1	1	-	-
PC2. identify welding requirements including relevant standards and codes from drawings, specifications and other customer and enterprise documentation	1	1	-	-
PC3. identify and arrange the AR system and simulator, tools, welding machines, measuring instruments, accessories, consumables and input materials (MS and SS plates) as per the requirements mentioned in WPS	1	1	-	1
PC4. check that material to be welded is as per the required specifications, quality and job requirement	1	2	-	-
PC5. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues	1	1	-	1
PC6. ensure that the AR software and applications used for welding are up-to-date, including any necessary calibration or firmware updates	-	2	-	1
PC7. calibrate AR devices to maintain accuracy in the overlayed instructions and welding parameters	1	1	-	1
PC8. plan the welding activities before starting the actual process as per WPS	1	2	-	-
PC9. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario	1	1	-	1
PC10. set up virtual welding scenarios related to vehicle parts welding such as indoor or outdoor welding, different positions (flat, horizontal, vertical), and the materials to be welded	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. follow appropriate safety practices as specified by organization during the work	1	2	-	-
Perform SMAW using AR technology	**12**	**21**	**-**	**10**
PC12. prepare the workpiece and materials for welding by cleaning, grinding, and positioning them according to project specification and the chosen welding scenario	1	1	-	1
PC13. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements	1	1	-	1
PC14. adjust the settings of the welding machine (e.g., amperage, voltage) to match the simulation	1	1	-	1
PC15. ensure that electrodes distance, contact area, pressure, application etc. are maintained as specified in Work Instructions (WI)	1	2	-	-
PC16. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process	1	1	-	1
PC17. perform SMAW tasks while utilizing the AR guidance for precision and quality control	1	1	-	1
PC18. use AR overlays to accurately position welds, identify critical areas, and ensure proper joint alignment	-	2	-	1
PC19. confirm weld to be performed as per the job plan and specifications	1	2	-	-
PC20. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation	1	1	-	1
PC21. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. follow AR system suggestions (if any) for corrections in case of arc is too long or too short, user is moving too fast or slow etc. to maintain an optimal arc length	1	2	-	1
PC23. produce joints of the specified dimensional accuracy and required weld quality	1	2	-	-
PC24. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing	1	1	-	1
PC25. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece	-	2	-	-
Perform post-welding operations	**8**	**13**	**-**	**4**
PC26. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations	-	1	-	1
PC27. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.	1	1	-	1
PC28. conduct destructive and non-destructive tests on the work pieces	1	1	-	1
PC29. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category	1	2	-	-
PC30. tag and store the right quality pieces by following organisational policies and procedures	1	2	-	-
PC31. clean and store all the tools, machine and equipment after completion of work	1	2	-	-
PC32. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations	1	1	-	-
PC33. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC34. report to the supervisor about any problems faced or anticipated during the complete process	1	1	-	-
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3129
NOS Name	Perform SMAW welding using AR technology
Sector	Automotive
Sub-Sector	
Occupation	Metal Joining
NSQF Level	2
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

ASC/N3130: Perform GMAW welding using AR technology

Description

This NOS unit is about performing GMAW activities and post-welding operations by utilizing augmented reality technology as per the given work order and the standards specified by the organization

Scope

The scope covers the following :

- Prepare for GMAW operations
- Perform GMAW using AR technology
- Perform post-welding operations

Elements and Performance Criteria

Prepare for GMAW operations

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

PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders

PC2. identify and arrange the AR system and simulator, tools, MIG welding machines, measuring instruments, accessories, consumables and input materials as per the requirements mentioned in WPS or drawing

PC3. check that material to be welded is as per the required specifications, quality and job requirement

PC4. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues

PC5. calibrate AR devices to maintain accuracy in the overlayed instructions and welding parameters

PC6. plan the MIG welding activities before starting the actual process as per WPS

PC7. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario

PC8. set up virtual MIG welding scenarios for vehicle parts welding

PC9. follow appropriate safety practices as specified by organization during the work

Perform GMAW using AR technology

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

PC10. prepare the workpiece and materials for welding by cleaning, grinding, and positioning them according to project specification and the chosen welding scenario

PC11. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements

PC12. adjust the settings of the MIG welding machine (e.g., amperage, voltage) to match the simulation

PC13. ensure that electrodes distance, contact area, pressure, application etc. are maintained as specified in Work Instructions (WI)

PC14. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process

PC15. perform GMAW tasks while utilizing the AR guidance for precision and quality control

PC16. use AR overlays to accurately position welds, identify critical areas, and ensure proper joint alignment

PC17. confirm weld to be performed as per the job plan and specifications

PC18. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation

PC19. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)

PC20. follow AR system suggestions (if any) for corrections in case of arc is too long or too short, user is moving too fast or slow etc. to maintain an optimal arc length

PC21. produce joints of the specified dimensional accuracy and required weld quality

PC22. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing

PC23. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece

Perform post-welding operations

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

PC24. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations

PC25. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.

PC26. conduct destructive and non-destructive tests on the work pieces

PC27. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category

PC28. tag and store the right quality pieces by following organisational policies and procedures

PC29. clean and store all the tools, machine and equipment after completion of work

PC30. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations

PC31. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits

PC32. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. occupational health and safety in welding

KU3. basics of Welding (including types of joint and welding symbols)

KU4. overview of GMAW process

KU5. GMAW and its process flow
KU6. how to read and interpret WPS, welding drawings and symbols
KU7. welding specific equipment requirements for GMAW
KU8. safe welding practices and procedures and use of personal protective equipment (PPE)
KU9. different current and voltage settings, gas flow rates wire diameters, wire feed speed and other variables to suit typical situations
KU10. material and equipment preparation
KU11. properties and characteristics of materials and consumables
KU12. impact of various welding parameters like voltage, current, gas flow rate, speed, pressure, torch angle, cycle time, electrode distance etc. on the quality and quantity of welding
KU13. SOP recommended by the organisation for GMAW using AR technology
KU14. post-welding treatments
KU15. quality control and defect analysis of welded piece by using AR technology
KU16. factors that affect MIG welding quality standards
KU17. various defects associated with the GMAW process
KU18. various testing techniques like visual, destructive and non-destructive
KU19. safety requirements during the welding work

Generic Skills (GS)

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

GS1. read work instructions, equipment manuals and process documents
GS2. communicate the process requirements to the supervisor and co-workers
GS3. attentively listen and comprehend the information given by the supervisor/team members
GS4. write work related information in English/regional language
GS5. recognise a workplace problem and take suitable action
GS6. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
GS7. plan and organise work according to the work requirements
GS8. complete the assigned tasks with minimum supervision
GS9. 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
Prepare for GMAW operations	**10**	**14**	**-**	**5**
PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders	1	1	-	-
PC2. identify and arrange the AR system and simulator, tools, MIG welding machines, measuring instruments, accessories, consumables and input materials as per the requirements mentioned in WPS or drawing	1	1	-	1
PC3. check that material to be welded is as per the required specifications, quality and job requirement	1	2	-	-
PC4. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues	1	1	-	1
PC5. calibrate AR devices to maintain accuracy in the overlayed instructions and welding parameters	1	2	-	1
PC6. plan the MIG welding activities before starting the actual process as per WPS	1	2	-	-
PC7. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario	2	1	-	1
PC8. set up virtual MIG welding scenarios for vehicle parts welding	1	2	-	1
PC9. follow appropriate safety practices as specified by organization during the work	1	2	-	-
Perform GMAW using AR technology	**12**	**22**	**-**	**10**
PC10. prepare the workpiece and materials for welding by cleaning, grinding, and positioning them according to project specification and the chosen welding scenario	1	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements	1	1	-	1
PC12. adjust the settings of the MIG welding machine (e.g., amperage, voltage) to match the simulation	1	1	-	1
PC13. ensure that electrodes distance, contact area, pressure, application etc. are maintained as specified in Work Instructions (WI)	1	2	-	-
PC14. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process	1	1	-	1
PC15. perform GMAW tasks while utilizing the AR guidance for precision and quality control	1	1	-	1
PC16. use AR overlays to accurately position welds, identify critical areas, and ensure proper joint alignment	-	2	-	1
PC17. confirm weld to be performed as per the job plan and specifications	1	2	-	-
PC18. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation	1	2	-	1
PC19. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)	1	2	-	1
PC20. follow AR system suggestions (if any) for corrections in case of arc is too long or too short, user is moving too fast or slow etc. to maintain an optimal arc length	1	2	-	1
PC21. produce joints of the specified dimensional accuracy and required weld quality	1	2	-	-
PC22. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing	1	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece	-	2	-	-
Perform post-welding operations	**8**	**14**	**-**	**5**
PC24. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations	-	1	-	1
PC25. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.	1	2	-	1
PC26. conduct destructive and non-destructive tests on the work pieces	1	1	-	1
PC27. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category	1	2	-	1
PC28. tag and store the right quality pieces by following organisational policies and procedures	1	2	-	-
PC29. clean and store all the tools, machine and equipment after completion of work	1	2	-	-
PC30. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations	1	1	-	-
PC31. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits	1	2	-	1
PC32. report to the supervisor about any problems faced or anticipated during the complete process	1	1	-	-
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3130
NOS Name	Perform GMAW welding using AR technology
Sector	Automotive
Sub-Sector	
Occupation	Metal Joining
NSQF Level	2
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

ASC/N3131: Perform GTAW welding using AR technology

Description

This NOS unit is about performing GTAW activities and post-welding operations by utilizing augmented reality technology as per the given work order and the standards specified by the organization

Scope

The scope covers the following :

- Prepare for GTAW operations
- Perform GTAW using AR technology
- Perform post-welding operations

Elements and Performance Criteria

Prepare for GTAW operations

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

PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders

PC2. identify and arrange the AR system and simulator, tools, TIG welding machines, measuring instruments, accessories, consumables and input materials as per the requirements mentioned in WPS or drawing

PC3. check that material to be welded is as per the required specifications, quality and job requirement

PC4. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues

PC5. calibrate AR devices to maintain accuracy in the overlayed instructions and welding parameters

PC6. plan the TIG welding activities before starting the actual process as per WPS

PC7. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario

PC8. set up virtual TIG welding scenarios for vehicle parts welding

PC9. follow appropriate safety practices as specified by organization during the work

Perform GTAW using AR technology

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

PC10. prepare the workpiece and materials for welding by cleaning, grinding, and positioning them according to project specification and the chosen welding scenario

PC11. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements

PC12. adjust the settings of the TIG welding machine (e.g., amperage, voltage) to match the simulation

PC13. ensure that electrodes distance, contact area, pressure, application etc. are maintained as specified in Work Instructions (WI)

PC14. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process

PC15. perform GTAW tasks while utilizing the AR guidance for precision and quality control

PC16. use AR overlays to accurately position welds, identify critical areas, and ensure proper joint alignment

PC17. confirm weld to be performed as per the job plan and specifications

PC18. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation

PC19. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)

PC20. follow AR system suggestions (if any) for corrections in case of arc is too long or too short, user is moving too fast or slow etc. to maintain an optimal arc length

PC21. produce joints of the specified dimensional accuracy and required weld quality

PC22. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing

PC23. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece

Perform post-welding operations

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

PC24. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations

PC25. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.

PC26. conduct destructive and non-destructive tests on the work pieces

PC27. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category

PC28. tag and store the right quality pieces by following organisational policies and procedures

PC29. clean and store all the tools, machine and equipment after completion of work

PC30. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations

PC31. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits

PC32. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. occupational health and safety in welding

KU3. basics of Welding (including types of joint and welding symbols)

KU4. overview of GTAW process

KU5. GTAW and its process flow
KU6. how to read and interpret WPS, welding drawings and symbols
KU7. welding specific equipment requirements for GTAW
KU8. safe welding practices and procedures and use of personal protective equipment (PPE)
KU9. different current and voltage settings, gas flow rates wire diameters, wire feed speed and other variables to suit typical situations
KU10. material and equipment preparation
KU11. properties and characteristics of materials and consumables
KU12. impact of various welding parameters like voltage, current, gas flow rate, speed, pressure, torch angle, cycle time, electrode distance etc. on the quality and quantity of welding
KU13. SOP recommended by the organisation for GTAW using AR technology
KU14. post-welding treatments
KU15. quality control and defect analysis of welded piece by using AR technology
KU16. factors that affect MIG welding quality standards
KU17. various defects associated with the GTAW process
KU18. various testing techniques like visual, destructive and non-destructive
KU19. safety requirements during the welding work

Generic Skills (GS)

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

GS1. read work instructions, equipment manuals and process documents
GS2. communicate the process requirements to the supervisor and co-workers
GS3. attentively listen and comprehend the information given by the supervisor/team members
GS4. write work related information in English/regional language
GS5. recognise a workplace problem and take suitable action
GS6. analyse and apply the information gathered from observation, experience, reasoning or communication to act efficiently
GS7. plan and organise work according to the work requirements
GS8. complete the assigned tasks with minimum supervision
GS9. 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
Prepare for GTAW operations	**10**	**14**	**-**	**5**
PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders	1	1	-	-
PC2. identify and arrange the AR system and simulator, tools, TIG welding machines, measuring instruments, accessories, consumables and input materials as per the requirements mentioned in WPS or drawing	1	1	-	1
PC3. check that material to be welded is as per the required specifications, quality and job requirement	1	2	-	-
PC4. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues	1	1	-	1
PC5. calibrate AR devices to maintain accuracy in the overlayed instructions and welding parameters	1	2	-	1
PC6. plan the TIG welding activities before starting the actual process as per WPS	1	2	-	-
PC7. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario	2	1	-	1
PC8. set up virtual TIG welding scenarios for vehicle parts welding	1	2	-	1
PC9. follow appropriate safety practices as specified by organization during the work	1	2	-	-
Perform GTAW using AR technology	**12**	**22**	**-**	**10**
PC10. prepare the workpiece and materials for welding by cleaning, grinding, and positioning them according to project specification and the chosen welding scenario	1	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. install the work pieces and fixture on the apparatus and align them with the electrodes as per the job requirements	1	1	-	1
PC12. adjust the settings of the TIG welding machine (e.g., amperage, voltage) to match the simulation	1	1	-	1
PC13. ensure that electrodes distance, contact area, pressure, application etc. are maintained as specified in Work Instructions (WI)	1	2	-	-
PC14. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process	1	1	-	1
PC15. perform GTAW tasks while utilizing the AR guidance for precision and quality control	1	1	-	1
PC16. use AR overlays to accurately position welds, identify critical areas, and ensure proper joint alignment	-	2	-	1
PC17. confirm weld to be performed as per the job plan and specifications	1	2	-	-
PC18. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation	1	2	-	1
PC19. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)	1	2	-	1
PC20. follow AR system suggestions (if any) for corrections in case of arc is too long or too short, user is moving too fast or slow etc. to maintain an optimal arc length	1	2	-	1
PC21. produce joints of the specified dimensional accuracy and required weld quality	1	2	-	-
PC22. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing	1	1	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC23. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece	-	2	-	-
Perform post-welding operations	**8**	**14**	**-**	**5**
PC24. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations	-	1	-	1
PC25. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.	1	2	-	1
PC26. conduct destructive and non-destructive tests on the work pieces	1	1	-	1
PC27. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category	1	2	-	1
PC28. tag and store the right quality pieces by following organisational policies and procedures	1	2	-	-
PC29. clean and store all the tools, machine and equipment after completion of work	1	2	-	-
PC30. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations	1	1	-	-
PC31. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits	1	2	-	1
PC32. report to the supervisor about any problems faced or anticipated during the complete process	1	1	-	-
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3131
NOS Name	Perform GTAW welding using AR technology
Sector	Automotive
Sub-Sector	
Occupation	Metal Joining
NSQF Level	2
Credits	3
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

ASC/N3132: Perform robotic welding using AR technology

Description

This NOS unit is about performing robotic welding activities and post-welding operations by utilizing augmented reality technology as per the given work order and the standards specified by the organization

Scope

The scope covers the following :

- Prepare for robotic welding operations
- Write robotic welding program
- Perform robotic welding using AR technology
- Perform post-welding operations

Elements and Performance Criteria

Prepare for GTAW operations

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

PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders

PC2. identify and arrange the AR system and simulator, tools, robotic arm, measuring instruments, accessories, consumables and input materials as per the requirements mentioned in WPS or drawing

PC3. check that material to be welded is as per the required specifications, quality and job requirement

PC4. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues

PC5. plan the welding activities before starting the actual process as per WPS

PC6. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario

PC7. set up virtual robotic welding scenarios for vehicle parts welding

PC8. follow appropriate safety practices as specified by organization during the work

Write robotic welding program

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

PC9. identify robotic technology, welding robot features and specifications including robot language and welding process and parameter capabilities to be used in welding applications

PC10. plan robot welding program

PC11. confirm required operations for robot arm and torch, types of weld, any positions or welds requiring non-standard instructions to be performed using appropriate technical reference sources

PC12. review robot file library for correct references to weld size and weld type

PC13. identify suitable program code for robotic technology and welding applications

PC14. write joint arm and welding moves using teach pendant or software

PC15. use software including canned cycles and sub-routines for programming welding operations

PC16. program weld procedure for the robot using short, interrupted and continuous welds

PC17. create command instructions for welding instructions

PC18. perform any additional programming required including instructions, weld data recording and lower-level programming

PC19. check the sequence of the program as per the process sheet

PC20. test and debug the program for weld accuracy, compatibility and efficiency requirements by conducting trial run of the robotic arm on test material

PC21. verify trial welds and program performance against required specifications

PC22. edit program to adjust welding operations based on trial outcomes

PC23. save final program and complete operation sheets and any required records according to enterprise procedures

Perform robotic welding using AR technology

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

PC24. install the work pieces and fixture on the apparatus and align them with the robotic arm as per the job requirements

PC25. set up robotic arm for functional operation in accordance with manufacturer's specifications

PC26. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process

PC27. perform welding by operating robotic arm and tack weld the joint at appropriate intervals specifications while utilizing the AR guidance in accordance with job plan, specifications, relevant welding standards and manufacturers'

PC28. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)

PC29. follow AR system suggestions (if any) for corrections during the welding process

PC30. produce joints of the specified dimensional accuracy and required weld quality

PC31. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing

PC32. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece

Perform post-welding operations

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

PC33. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations

PC34. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.

PC35. conduct destructive and non-destructive tests on the work pieces

PC36. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category

PC37. tag and store the right quality pieces by following organisational policies and procedures

PC38. clean and store all the tools, machine and equipment after completion of work

PC39. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations

PC40. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits

PC41. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. overview of robotic automation and its application in welding

KU3. mechanization, orbital and robot welding

KU4. welding specific equipment requirements for robotic welding

KU5. equipment and robotic arm settings

KU6. different current and voltage settings, gas flow rates, electrode feed and other variables to suit typical situations

KU7. material and equipment preparation

KU8. properties and characteristics of materials and consumables

KU9. impact of various welding parameters like voltage, current, gas flow rate, speed, pressure, torch angle, cycle time, electrode distance etc. on the quality and quantity of MIG welding

KU10. safety features and requirements of welding robots

KU11. welding symbols and abbreviations

KU12. welding parameters as applied to welding robots

KU13. welding robot programming including the use of standard program codes and comments, and input controls for welding robot programs

KU14. procedures for producing test pieces for NDT, sample plates and production plates

KU15. default positions and datum points used by welding robots

KU16. • procedures and good practice for writing welding robot programming with teach pendants includes:
• using the same wire stick out length
• ensuring axis moves of more than 180 degrees are made in two moves to ensure smooth motion
• robot posture is kept as close as possible to the home position
• using the wrist axis to position the torch angle
• avoiding excessive torch motion to create singularity on any axis
• avoiding multiple weld settings for the same joint type and touch ups for one defect on one part

KU17. procedures for trialling and editing welding robot programs

KU18. SOP recommended by the organisation for robotic wleding using AR technology

KU19. post-welding treatments

KU20. quality control and defect analysis of welded piece by using AR technology

KU21. various defects associated with the robotic process

KU22. various testing techniques like visual, destructive and non-destructive

KU23. safety requirements during the welding work

Generic Skills (GS)

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

GS1. read work instructions, equipment manuals and process documents

GS2. communicate the process requirements to the supervisor and co-workers

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

GS4. write work related information in English/regional language

GS5. recognise a workplace problem and take suitable action

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

GS7. plan and organise work according to the work requirements

GS8. complete the assigned tasks with minimum supervision

GS9. 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
Prepare for GTAW operations	**6**	**8**	**-**	**4**
PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders	1	1	-	1
PC2. identify and arrange the AR system and simulator, tools, robotic arm, measuring instruments, accessories, consumables and input materials as per the requirements mentioned in WPS or drawing	1	1	-	1
PC3. check that material to be welded is as per the required specifications, quality and job requirement	-	1	-	-
PC4. diagnose and resolve any technical issues related to AR tools and systems, including software, hardware, and connectivity issues	1	1	-	-
PC5. plan the welding activities before starting the actual process as per WPS	1	1	-	-
PC6. set welding parameters like current, voltage, electrode size, material thickness, and joint type in the AR simulator to match the real-world scenario	1	1	-	-
PC7. set up virtual robotic welding scenarios for vehicle parts welding	-	1	-	1
PC8. follow appropriate safety practices as specified by organization during the work	1	1	-	1
Write robotic welding program	**12**	**19**	**-**	**6**
PC9. identify robotic technology, welding robot features and specifications including robot language and welding process and parameter capabilities to be used in welding applications	1	1	-	1
PC10. plan robot welding program	1	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. confirm required operations for robot arm and torch, types of weld, any positions or welds requiring non-standard instructions to be performed using appropriate technical reference sources	1	2	-	1
PC12. review robot file library for correct references to weld size and weld type	1	2	-	-
PC13. identify suitable program code for robotic technology and welding applications	1	1	-	-
PC14. write joint arm and welding moves using teach pendant or software	1	1	-	-
PC15. use software including canned cycles and sub-routines for programming welding operations	-	1	-	1
PC16. program weld procedure for the robot using short, interrupted and continuous welds	1	2	-	-
PC17. create command instructions for welding instructions	1	1	-	1
PC18. perform any additional programming required including instructions, weld data recording and lower-level programming	-	2	-	1
PC19. check the sequence of the program as per the process sheet	1	1	-	-
PC20. test and debug the program for weld accuracy, compatibility and efficiency requirements by conducting trial run of the robotic arm on test material	1	1	-	-
PC21. verify trial welds and program performance against required specifications	-	1	-	-
PC22. edit program to adjust welding operations based on trial outcomes	1	1	-	-
PC23. save final program and complete operation sheets and any required records according to enterprise procedures	1	1	-	1
Perform robotic welding using AR technology	**6**	**11**	**-**	**6**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24. install the work pieces and fixture on the apparatus and align them with the robotic arm as per the job requirements	1	1	-	1
PC25. set up robotic arm for functional operation in accordance with manufacturer's specifications	-	1	-	1
PC26. use AR headsets and software to access welding instructions, visualize weld paths, and check for potential defects in real-time during the welding process	-	2	-	-
PC27. perform welding by operating robotic arm and tack weld the joint at appropriate intervals specifications while utilizing the AR guidance in accordance with job plan, specifications, relevant welding standards and manufacturers'	1	2	-	-
PC28. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the feedbacks or warning indicators on the AR system (if displayed)	1	1	-	1
PC29. follow AR system suggestions (if any) for corrections during the welding process	1	1	-	-
PC30. produce joints of the specified dimensional accuracy and required weld quality	1	1	-	1
PC31. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing	1	1	-	1
PC32. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece	-	1	-	1
Perform post-welding operations	**6**	**12**	**-**	**4**
PC33. use AR systems to visually inspect welds, ensuring they meet specified standards and regulations	1	1	-	-
PC34. inspect welds using AR simulation to identify defects like porosity, undercuts, improper penetration etc.	1	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC35. conduct destructive and non-destructive tests on the work pieces	-	1	-	1
PC36. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category	-	1	-	1
PC37. tag and store the right quality pieces by following organisational policies and procedures	1	1	-	-
PC38. clean and store all the tools, machine and equipment after completion of work	1	1	-	-
PC39. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations	1	2	-	1
PC40. maintain detailed records of weld quality and any issues that are identified, including photographs or videos captured via AR devices for quality audits	-	2	-	-
PC41. report to the supervisor about any problems faced or anticipated during the complete process	1	1	-	-
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3132
NOS Name	Perform robotic welding using AR technology
Sector	Automotive
Sub-Sector	
Occupation	Metal Joining
NSQF Level	2
Credits	4
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

ASC/N3133: Advanced Automotive Welding Mastery

Description

This NOS unit is about develop high-performance vehicles, including cars and motorcycles using advanced welding techniques such as MIG welding

Scope

The scope covers the following :

- Prepare for welding operations
- Perform advanced welding techniques
- Perform post-welding operations

Elements and Performance Criteria

Prepare for GTAW operations

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

PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders

PC2. identify and arrange required tools, machines and material as mentioned in WPS or drawing

PC3. check that material to be welded is as per the required specifications, quality and job requirement

PC4. plan the welding activities before starting the actual process as per WPS

PC5. set welding parameters like current, voltage, electrode size, material thickness, and joint type as per the requirement

PC6. follow appropriate safety practices as specified by organization during the work

Perform advanced welding techniques

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

PC7. install the work pieces and fixture on the apparatus and align them with torch and electrode as per the job requirements

PC8. perform advanced welding techniques such as MIG welding to weld critical components of advanced vehicles in accordance with job plan, specifications, relevant welding standards and manufacturers'

PC9. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation

PC10. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the various gauges and correct them if not within standards

PC11. produce joints of the specified dimensional accuracy and required weld quality

PC12. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing

PC13. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece

Perform post-welding operations

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

PC14. check the work pieces as per the work instructions for product quality

PC15. conduct destructive and non-destructive tests on the work pieces

PC16. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category

PC17. tag and store the right quality pieces by following organisational policies and procedures

PC18. clean and store all the tools, machine and equipment after completion of work

PC19. check the robotic arm for any malfunctions/defects or any service requirements and immediately inform the supervisor/maintenance team for the same

PC20. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations

PC21. report to the supervisor about any problems faced or anticipated during the complete process

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. relevant standards and procedures followed in the company

KU2. Advanced welding techniques

KU3. welding specific equipment requirements during welding

KU4. different current and voltage settings, gas flow rates, electrode feed and other variables to suit typical situations

KU5. material and equipment preparation

KU6. properties and characteristics of materials and consumables

KU7. impact of various welding parameters like voltage, current, gas flow rate, speed, pressure, torch angle, cycle time, electrode distance etc. on the quality and quantity of MIG welding

KU8. welding symbols and abbreviations

KU9. SOP recommended by the organisation for welding of advance vehicles

KU10. post-welding treatments

KU11. quality control and defect analysis of welded piece

KU12. various defects associated with the welding process

KU13. various testing techniques like visual, destructive and non-destructive

KU14. safety requirements during the welding work

Generic Skills (GS)

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

GS1. read work instructions, equipment manuals and process documents

GS2. communicate the process requirements to the supervisor and co-workers

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

GS4. write work related information in English/regional language

GS5. recognise a workplace problem and take suitable action

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

GS7. plan and organise work according to the work requirements

GS8. complete the assigned tasks with minimum supervision

GS9. 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
Prepare for GTAW operations	**8**	**13**	**-**	**5**
PC1. identify the work to be done and product specifications by interpreting the engineering drawing, Welding Procedure Specification (WPS) and job orders	2	2	-	-
PC2. identify and arrange required tools, machines and material as mentioned in WPS or drawing	2	3	-	1
PC3. check that material to be welded is as per the required specifications, quality and job requirement	1	2	-	1
PC4. plan the welding activities before starting the actual process as per WPS	1	2	-	1
PC5. set welding parameters like current, voltage, electrode size, material thickness, and joint type as per the requirement	1	2	-	1
PC6. follow appropriate safety practices as specified by organization during the work	1	2	-	1
Perform advanced welding techniques	**11**	**17**	**-**	**7**
PC7. install the work pieces and fixture on the apparatus and align them with torch and electrode as per the job requirements	2	2	-	1
PC8. perform advanced welding techniques such as MIG welding to weld critical components of advanced vehicles in accordance with job plan, specifications, relevant welding standards and manufacturers'	2	4	-	1
PC9. ensure correct angle of torch and filler wire, direction of weld and feed and travel speed during the welding operation	1	2	-	1
PC10. monitor the welding process parameters (air pressure, electrode force, electrode distance, gas flow etc. are within standards by reading the various gauges and correct them if not within standards	2	2	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. produce joints of the specified dimensional accuracy and required weld quality	2	3	-	1
PC12. measure the final welded piece and compare with the dimensions as prescribed in the WPS and engineering drawing	1	2	-	1
PC13. remove extra material, distortion etc. by using chipping hammers, grinders etc., from the welded piece	1	2	-	1
Perform post-welding operations	**11**	**20**	**-**	**8**
PC14. check the work pieces as per the work instructions for product quality	1	2	-	1
PC15. conduct destructive and non-destructive tests on the work pieces	1	3	-	1
PC16. separate the defective pieces which can be repaired/ reworked and pieces which are beyond repair and maintain records of each category	1	2	-	1
PC17. tag and store the right quality pieces by following organisational policies and procedures	1	4	-	1
PC18. clean and store all the tools, machine and equipment after completion of work	2	2	-	1
PC19. check the robotic arm for any malfunctions/defects or any service requirements and immediately inform the supervisor/maintenance team for the same	2	2	-	1
PC20. remove chips from different machine areas and dispose scrap or waste material in accordance with the company policies and environmental regulations	2	3	-	1
PC21. report to the supervisor about any problems faced or anticipated during the complete process	1	2	-	1
NOS Total	**30**	**50**	**-**	**20**

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3133
NOS Name	Advanced Automotive Welding Mastery
Sector	Automotive
Sub-Sector	
Occupation	Metal Joining
NSQF Level	2
Credits	4
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	08/05/2028
NSQC Clearance Date	08/05/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.

3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).

4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training centre based on these criteria.

5. In case of successfully passing only certain number of NOSs, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

6. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Minimum Aggregate Passing % at QP Level : 70

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

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N9803.Organize work and resources (Manufacturing)	50	30	-	20	100	15
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	10
ASC/N3129.Perform SMAW welding using AR technology	30	50	0	20	100	25
ASC/N3130.Perform GMAW welding using AR technology	30	50	0	20	100	25
ASC/N3131.Perform GTAW welding using AR technology	30	50	0	20	100	25
Total	**160**	**210**	**-**	**80**	**450**	**100**

Optional: 1 Robotic Welding

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N3132.Perform robotic welding using AR technology	30	50	0	20	100	25
Total	**30**	**50**	**-**	**20**	**100**	**25**

Optional: 2 Advanced Welding Mastery

Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N3133.Advanced Automotive Welding Mastery	30	50	0	20	100	25
Total	**30**	**50**	**-**	**20**	**100**	**25**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
PPE	Personal Protective Equipment
PwD	Person with Disability
SOP	Standard Operating Practices

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.