



Model Curriculum

QP Name: Automotive Welding Machine Operator (Manual and Robotics)

QP Code: ASC/Q3102

QP Version: 2.0

NSQF Level: 3

Model Curriculum Version: 1.0

Table of Contents

Training Parameters.....	3
Program Overview	4
Training Outcomes.....	4
Compulsory Modules.....	4
Module 1: Introduction to the role of a Automotive Welding Machine Operator (Manual and Robotics).....	6
Module 2: Organize work and resources according to safety and conservation standards	7
Module 3: Communicate Effectively and Efficiently.....	9
Module 4: Interpret engineering drawing	10
Module 5: Prepare for welding activities.....	11
Module 6: Perform welding and post-welding activities.....	13
Annexure.....	15
Trainer Requirements	15
Assessor Requirements.....	16
Assessment Strategy.....	19
References	18
Glossary.....	18
Acronyms and Abbreviations.....	19

Training Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Metal Joining
Country	India
NSQF Level	3
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7212.0303
Minimum Educational Qualification and Experience	10th Class OR Certificate-NSQF (Automotive Welding Assistant) with 1-2 years experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	23/09/2020
Next Review Date	23/09/2025
NSQC Approval Date	
QP Version	2.0
Model Curriculum Creation Date	23/09/2020
Model Curriculum Valid Up to Date	23/09/2025
Model Curriculum Version	1.0
Minimum Duration of the Course	320 Hours 00 Minutes
Maximum Duration of the Course	320 Hours 00 Minutes

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Interpret engineering drawings for identification of raw material, tools and required equipment for the welding operations.
- Support technician in pre-welding activities such as inspection of tools and equipment etc.
- Support technician in welding operations such as SMAW, MIG, MAG, TIG, Resistance Welding, Robotic Welding etc.
- Support technician in post-welding operations such as inspection, quality check, cleaning etc.
- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Optimize the use of resources to ensure less wastage and maximum conservation.
- Communicate effectively using interpersonal skills.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<i>Introduction to the role of an Automotive Welding Machine Operator</i> <i>Bridge Module</i>	8:00	0:00			8:00
ASC/N9803 – Organize work and resources (Manufacturing) NOS Version No. – 1.0 NSQF Level - 3	16:00	24:00			40:00
Organize work and resources according to safety and conservation standards	16:00	24:00			40:00
ASC/N9802 – Interact effectively with colleagues, customers and others NOS Version No. – 1.0 NSQF Level - 3	12:00	20:00			32:00
Communicate Effectively and Efficiently	12:00	20:00			32:00
ASC/N9805 – Interpret engineering drawing NOS Version No. – 1.0 NSQF Level - 4	16:00	16:00			32:00

Interpret engineering drawing	16:00	16:00			32:00
ASC/N3105 – Support the technician in welding process NOS Version No. – 2.0 NSQF Level - 3	32:00	56:00			88:00
Prepare for welding activities	32:00	56:00			88:00
ASC/N3105 – Support the technician in welding process NOS Version No. – 2.0 NSQF Level - 3	36:00	84:00			120:00
Support in welding and post-welding activities	36:00	84:00			120:00
Total Duration	120:00	200:00			320:00

Module Details

Module 1

Introduction to the role of an Automotive Welding Machine Operator (Manual and Robotics)

Bridge module

Terminal Outcomes:

- Discuss the role and responsibilities of an Automotive Welding Machine Operator.

Duration: <08:00>	Duration: <00:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the role and responsibilities of an Automotive Welding Machine Operator. • List the job opportunities for an Automotive Welding Machine Operator in Automotive industry. • Explain about Indian automotive manufacturing market. • List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them. • Discuss the standards and procedures involved in the different welding processes. • Identify the standard checklists and schedules recommended by OEM. 	
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<ul style="list-style-type: none"> • Sample checklist of tools and equipment 	

Module 2

Organize work and resources according to safety and conservation standards

Mapped to ASC/N9803

Terminal Outcomes:

- Employ appropriate ways to maintain safe and secure working environment.
- Perform work as per the quality standards.
- Apply conservation practices at the workplace.

Duration: <16:00>	Duration: <24:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List the potential workplace related risks and hazards, their causes and preventions. • Identify PPE to be used at workplace. • Identify various warning signs used at the workplace. • Describe appropriate strategies to deal with emergencies and accidents at the workplace. • Outline the organizational structure to be followed to report about health, safety and security breaches to the concerned authorities. • Discuss the importance of keeping work area clean and tidy. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. • Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any to the concerned authorities. • Discuss the ways of dealing with stress and anxiety. • Discuss how to complete the given work within the stipulated time period. • Explain how to maintain a proper balance between team and individual goals. • Explain 5S guidelines at workplace. • List the various materials used at the workplace. • Explain organisational recommended procedure for storage of tools, equipment and material after completion of work. • Explain the ways to optimize usage of resources. 	<ul style="list-style-type: none"> • Apply appropriate safety practices to ensure safety of people at the workplace • Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate the use of fire extinguisher. • Apply basic first aid procedure in case of emergencies. • Perform routine cleaning of tools, equipment and machines. • Employ various techniques for checking malfunctions in the equipment as per Standard Operating Procedure (SOP). • Show how to sanitize and disinfect one's work area regularly. • Demonstrate the correct way of washing hands using soap and water. • Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs. • Demonstrate how to evacuate the workplace in case of an emergency. • Demonstrate sorting of materials, tools and equipment and spare parts after completion of work. • Demonstrate the steps involved in storage of tools, equipment and material after completion of work. • Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. • Demonstrate different disposal techniques depending upon types of waste. • Employ different ways to check if equipment/machines are functioning as per requirements and report malfunctioning, if observed.

<ul style="list-style-type: none"> • Discuss various methods of waste management and its disposal. • List the different categories of waste for the purpose of segregation • Differentiate between recyclable and non-recyclable waste • State the importance of using appropriate colour dustbins for different types of waste. • Discuss common practices for conserving electricity at workplace. • Discuss the common sources of pollution and ways to minimize it. 	<ul style="list-style-type: none"> • Employ ways for efficient utilization of material and water.
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<ul style="list-style-type: none"> • Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher • Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit 	

Module 3

Communicate Effectively and Efficiently

Mapped to ASC/N9802

Terminal Outcomes:

- Use effective communication and interpersonal skills.
- Apply sensitivity while interacting with different genders and people with disabilities.

Duration: <12:00>	Duration: <20:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain the organizational structure for communicating with colleagues, seniors and others. • Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD). • Explain the importance of respecting personal space of colleagues. • State the procedure to receive work instructions and report problems to the supervisor. • List the various organizational policies and procedures to be followed at the workplace. • Describe different ways to rectify commonly occurring errors. • Explain the importance of complying with the instructions/guidelines and procedures while performing tasks related to the job specifications. • Discuss the importance of PwD and gender sensitization. 	<ul style="list-style-type: none"> • Employ different means of communication depending upon the requirement while interacting with others. • Demonstrate using new ways to maintain good relationships with colleagues and supervisor. • Prepare a sample report to send the work status to the supervisor. • Demonstrate how to communicate with different genders and persons with disability (PwD) in a sensitive manner.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Sample of escalation matrix, organisation structure.	

Module 4

Interpret engineering drawing

Mapped to ASC/N9805

Terminal Outcomes:

- Describe the basics of engineering drawing.
- Interpret the machine drawings and symbols for understanding the job requirements.

Duration: <16:00>	Duration: <16:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Identify uniqueness, dimensioning and important features of 2D and 3D shapes. • Identify types of lines, angles, points and their symmetry in shapes. • Differentiate between first angle and third angle projection. • Interpret 3 axis (x, y and z axis) of projection and welding symbols used in drawing. • Describe GD&T and use of its symbols in the drawings. • Identify required limits and tolerances of component from drawing. • Explain standards used in India for making welding drawings. • Identify organisational drawing standards for interpreting the work requirements appropriately. 	<ul style="list-style-type: none"> • Read an object in first angle and third angle projection. • Demonstrate appropriate way of reading and interpreting the shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection. • Interpret and read orthographic and isometric views. • Read GD&T symbols in the given drawing. • Employ appropriate ways of storing the drawings in a defined and appropriate place. • Role play a situation on how to communicate the changes in drawing to the concerned authority.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<ul style="list-style-type: none"> • Drawing tools • Welding drawing handbook • Welding drawings 	

Module 5

Prepare for welding activities

Mapped to ASC/N3105

Terminal Outcomes:

- Identify tools and equipment required for welding.
- Perform pre-welding activities such as inspection of tools and equipment, selection of workpiece etc.

Duration: <32:00>	Duration: <56:00>
<p>Theory – Key Learning Outcomes</p> <ul style="list-style-type: none"> • Discuss basic principle of welding process. • Describe various types of welding (SMAW, MIG, MAG, TIG, Resistance Welding, Robotic Welding etc), welding joints and welding positions. • Discuss the information derived from the job orders and engineering drawings and identify the work requirements. • Explain the selection criteria of raw material or input component for the welding work. • List tools, equipment, accessories, consumables and measuring instruments required during the welding and post-welding work. • Summarise the steps to be performed for checking the tools and equipment before use. • Recall the methods for cleaning electrodes, metal surfaces etc. • Discuss welding parameters like voltage, current, gas flow rate, speed, electrodes distance, contact area, pressure etc. and their impact on output. • Summarise the steps to be performed for installing the work pieces on the apparatus and aligning with the electrodes as per requirements. 	<p>Practical – Key Learning Outcomes</p> <ul style="list-style-type: none"> • Select the tools, equipment, accessories, consumables, measuring instruments and raw material required for work. • Demonstrate how to check the input material for the welding work as per the work instructions. • Apply appropriate ways to check the tools and equipment for defects before use. • Demonstrate the standard operating procedures for using tools, equipment and measuring instruments required during job. • Demonstrate how to set the welding machine and select the welding parameters as per the work instructions and in coordination with the welding technician. • Demonstrate the procedure of installing the work pieces on the apparatus and aligning with the electrodes.
<p>Classroom Aids:</p> <p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p> <ul style="list-style-type: none"> • Basic tool box, Work bench with vice • Hammer scaling 0.25 kg. with handle, Hammer ball pin 1 kg. with handle, Chisel cold flat 19 mm, Chisel cold cross 9mm, Centre punch 9mm x 127mm, Dividers 20 cm, Wire brush 15 cm x 3.7 	

mm, Spark lighter, Chipping screen hand, Number punch 6 mm and letter punch 6 mm, Square blade 15 cm, Scriber 15 cm, Tongs holding

- Brass rule 30 cm or nickel chrome steel rule 30 cm, Screw driver 25cm blade and 20 cm blade, Hacksaw frame adjustable 30 cm, Magnifying glass 15 cm, Weld measuring gauge fillet and butt, File half round bastard 30 cm, File flat 35 cm rough, Steel tape 182 cm flexible in case, Try square
- Rubber hose clips, Spindle key (for opening cylinder valve), Pressure regulator oxygen double stage, Pressure regulator acetylene regulator, Tip cleaner, Outfit spanner
- Power hacksaw, Portable grinder
- Power source, TIG welding set complete 300 amps with flexible coupling copper wound, Welding cables to carry 350 amps with flexible rubber copper, GMAW/MIG welding set, Spot / Butt welding set
- Dye penetrant test kit, Ultrasonic testing kit, Magnetic particle testing kit, X-ray testing kit
- Hand book, job orders, work order, completion material requests, and Technical Reference Books.
- Safety materials: Fire extinguisher, welding helmet, Leather sleeves, leather safety gloves, leather aprons, safety glasses with side shields, ear plug, safety shoes and first-aid kit
- Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel

Module 6

Support in welding and post-welding activities

Mapped to ASC/N3102

Terminal Outcomes:

- Perform various types of welding such as MIG, TIG, Robotic etc.
- Identify requirements for post-welding activities.
- Perform post-welding activities.

Duration: <36:00>	Duration: <84:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Discuss the importance of monitoring process parameters during the welding and correcting them as per the requirements. • Describe finishing processes such as dimensions check, removing extra material, hammering workpiece into desired shape etc. as per the required specifications. • Explain the process of evaluating the irregularities of welded input with the specified quality standards. • Discuss post welding processes like inspection, cleaning, maintenance etc. • Explain methods of inspecting the quality of welded workpieces. • List the commonly occurring defects in the welded workpieces. • Discuss various testing techniques like visual inspection, destructive and non-destructive tests. • Discuss the process of segregating, tagging and storing of damaged and ok workpieces and maintaining records of segregation as per organisational guidelines. • List the steps to be performed for checking the machine operations for any defects in its component and informing the supervisor. • Identify different methods for disposing off waste material and scrap. • Discuss the necessary precautions to avoid any hazard and accident during welding activities. 	<ul style="list-style-type: none"> • Demonstrate organizational specified procedure of all types of welding such as SMAW, MIG, MAG, TIG, Resistance Welding, Robotic Welding etc. • Demonstrate how to support Technician during welding operations. • Read the measurement gauges and monitor the process parameters to maintain the quality standards. • Employ appropriate ways of measuring and comparing welded piece dimensions with the specified dimensions in the job orders. • Apply appropriate ways to remove extra material from welded piece and hammer it into desired shape as per the required specifications. • Apply appropriate inspection methods for identifying the defects in welded workpieces. • Employ appropriate testing techniques like destructive and non-destructive tests for checking the quality of welded workpiece. • Show how to segregate, tag, store and record data of damaged and ok workpieces as per organisational guidelines. • Demonstrate how to remove chips from different machine areas and dispose waste as per organisational guidelines.

Classroom Aids:

Whiteboard, marker pen, projector

Tools, Equipment and Other Requirements

- Basic tool box, Work bench with vice
- Hammer scaling 0.25 kg. with handle, Hammer ball pin 1 kg. with handle, Chisel cold flat 19 mm, Chisel cold cross 9mm, Centre punch 9mm x 127mm, Dividers 20 cm, Wire brush 15 cm x 3.7 mm, Spark lighter, Chipping screen hand, Number punch 6 mm and letter punch 6 mm, Square blade 15 cm, Scriber 15 cm, Tongs holding
- Brass rule 30 cm or nickel chrome steel rule 30 cm, Screw driver 25cm blade and 20 cm blade, Hacksaw frame adjustable 30 cm, Magnifying glass 15 cm, Weld measuring gauge fillet and butt, File half round bastard 30 cm, File flat 35 cm rough, Steel tape 182 cm flexible in case, Try square
- Rubber hose clips, Spindle key (for opening cylinder valve), Pressure regulator oxygen double stage, Pressure regulator acetylene regulator, Tip cleaner, Outfit spanner
- Power hacksaw, Portable grinder
- Power source, TIG welding set complete 300 amps with flexible coupling copper wound, Welding cables to carry 350 amps with flexible rubber copper, GMAW/MIG welding set, Spot / Butt welding set
- Dye penetrant test kit, Ultrasonic testing kit, Magnetic particle testing kit, X-ray testing kit
- Hand book, job orders, work order, completion material requests, and Technical Reference Books.
- Safety materials: Fire extinguisher, welding helmet, Leather sleeves, leather safety gloves, leather aprons, safety glasses with side shields, ear plug, safety shoes and first-aid kit
- Cleaning material: Tip cleaner, wire brush (M.S.), cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Welding	3	Welding	1	Welding	NA
ITI	Welding	4	Welding	0	Welding	NA
Certificate NSQ- Level 5	Automobile Welding Lead Technician	3	Welding	1	Welding	NA

Trainer Certification	
Domain Certification	Platform Certification
“Automotive Welding Machine Operator (Manual and Robotics), ASC/Q3102, version 2.0”. Minimum accepted score is 80%.	“Trainer, MEP/Q2601” Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
ITI	Welder	4	Welding	1	Welding	NA
ITI	Welder	5	Welding	0	Welding	NA
Certificate NSQ- Level 5	Automobile Welding Lead Technician	4	Welding	1	Welding	NA

Assessor Certification	
Domain Certification	Platform Certification
“Automotive Welding Machine Operator (Manual and Robotics), ASC/Q3102, version 2.0”. Minimum accepted score is 80%.	“Assessor; MEP/Q2701” Minimum accepted score is 80%.

Assessment Strategy

1. Assessment System Overview:
 - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
 - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
 - Assessment agency deploys the ToA certified Assessor for executing the assessment
 - SSC monitors the assessment process & records
2. Testing Environment:
 - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
 - Check the duration of the training.
 - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
 - If the batch size is more than 30, then there should be 2 Assessors.
 - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
 - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
 - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
 - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
 - Question papers created by the Subject Matter Experts (SME)
 - Question papers created by the SME verified by the other subject Matter Experts
 - Questions are mapped with NOS and PC
 - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
 - Assessor must be ToA certified & trainer must be ToT Certified
 - Assessment agency must follow the assessment guidelines to conduct the assessment
4. Types of evidence or evidence-gathering protocol:
 - Time-stamped & geotagged reporting of the assessor from assessment location
 - Centre photographs with signboards and scheme specific branding
 - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
 - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos
5. Method of verification or validation:
 - Surprise visit to the assessment location
 - Random audit of the batch
 - Random audit of any candidate
6. Method for assessment documentation, archiving, and access
 - Hard copies of the documents are stored
 - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
 - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training .
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module . A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

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 Procedure
GD&T	Geometric Dimensioning & Tolerancing
CAD	Computer-Aided Drafting
CAM	Computer-Aided Manufacturing
CNC	Computerized Numerical Control
WI	Work Instructions
ISO	International Organization for Standardization