Automotive Skills Development Council

QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR AUTOMOTIVE INDUSTRY

Contents

What are Occupational Standards (OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualifications Pack-Soldering and Brazing Operator

SECTOR: AUTOMOTIVE

SUB-SECTOR: MANUFACTURING

OCCUPATION: SOLDERING AND BRAZING

JOB ROLE: SOLDERING AND BRAZING TECHNICIAN

REFERENCE ID: ASC/Q4201

ALIGNED TO:NCO-2004/7212.50

Soldering and Brazing Technician: Also known as soldering and brazing operator, this role is similar to a Gas Arc Welding technician and resistance welding technician. Primarily the role is engaged in joining various metallic parts during the automobile component manufacturing process

Brief Job Description: This role is responsible for joining various types of metallic frames, structures, jigs, plates, sheets, wires etc. using heating and melting process created through electrical power and gaseous discharge, maintaining process parameters, conducting quality checks on output product and maintaining a safe & healthy working environment on the shop floor.

Personal Attributes: Reading, writing and communication skills, ability to plan and prioritize, quality consciousness, sensitivity to problem solving, quick decision making, safety orientation, Dexterity, Hand eye coordination, high precision, ability to use internal ERP systems (if existing), Good vision, no color blindness

Job Details

Qualifications Pack Code	**ASC/Q4201**		
Job Role	**Soldering and Brazing technician**		
Credits(NSQF)	**TBD**	**Version number**	**1.1**
Industry	**Automotive**	**Drafted on**	**15/10/2013**
Sub-sector	**Manufacturing**	**Last reviewed on**	**15/11/2013**
Occupation	**Soldering/ Brazing**	**Next review date**	**15/11/2015**

Job Role	**Soldering and brazing technician**
Role Description	The role is responsible for joining various types of metallic frames, structures, jigs, plates, sheets etc. using heating and melting process created through electrical power and gaseous discharge, maintaining process parameters, conducting quality checks on output product and maintaining a safe & healthy working environment on the shop floor
NSQF level	4
Minimum Educational Qualifications	ITI – Mechanical/ Welding Technology
Maximum Educational Qualifications	Class 12
Training (Suggested but not mandatory)	• Different soldering and brazing techniques used in organizations • Geometric Dimensioning and Tolerance • Different soldering and brazing standards • 5S and Safety aspects • Problem Solving Techniques • Quality Management Systems • Knowledge of IT systems and ERP
Experience	3-4 years in soldering/ brazing/ welding process
Occupational Standards (OS)	1. ASC/N4201: Understanding work requirements and setting up the apparatus for soldering and brazing 2. ASC/N4202:Conduct the brazing and soldering process to join the work pieces 3. ASC/N4203:Ensure completion of post operations activities of inspection, storage and maintenance 4. ASC/N0006A: Maintain a safe and healthy working environment at the workplace 5. ASC/N0021: Maintaining 5S at the work premises
Performance Criteria	As described in the relevant NOS units

Definitions

Keywords /Terms	Description
Core Skills/Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of NOS.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
National Occupational Standards (NOS)	NOS are Occupational Standards which apply uniquely in the Indian context
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Organisational Context	Organisational Context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
Qualifications Pack(QP)	Qualifications Pack comprises the set of NOS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Scope	Scope is the 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 the quality of performance required.
Sector	Sector is a conglomeration of different business operations having similar businesses 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.
Sub-functions	Sub-functions are sub-activities essential to fulfil the achieving the objectives of the function.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Unit Code	Unit Code is a unique identifier for a NOS unit, which can be denoted with an '**N**'
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Vertical	Vertical may exist within a sub-sector representing different domain areas or the client industries served by the industry.

Acronyms

Keywords /Terms	Description
NOS	National Occupational Standard(s)
NVEQF	National Vocational Education Qualifications Framework
NVQF	National Vocational Qualifications Framework
NSQF	National Skills Qualifications Framework
OEM	Original Equipment Manufacturer
OS	Occupational Standard(s)
QP	Qualifications Pack

National Occupational Standard

Overview

This unit is about understanding the product design and work order requirements by analyzing the available engineering drawings and sketches.

ASC/N4201: Understanding work requirements and setting up the apparatus for soldering and brazing

National Occupational Standard

Unit Code	ASC/N4201
Unit Title (Task)	Understanding work requirements and setting up the apparatus for soldering and brazing
Description	This NOS unit is about analysing the work requirements by interpreting the drawings and sketches provided by the supervisor, understanding measurement dimensions and applying the knowledge to determine the process which needs to be followed to create the work order as per the specifications mentioned in the work order followed by arranging for suitable equipment required for the soldering and brazing activities
Scope	The technician will be responsible for • understanding the work order, engineering drawing and sketches • storing the drawings in the correct place • escalations of any queries regarding the job The job holder will cover all types soldering and brazing methods for joining auto components and vehicle body. The role holder will interact with the assembly line, paint shop, maintenance team and material management team

Performance Criteria(PC) w.r.t. the Scope	
Element	**Performance Criteria**
Identify the right drawing and process to be used for soldering and brazing process	PC1. Check the version of the engineering drawing provided and select the latest version of the available engineering drawing so that the final measurements and design is available with the team PC2. Thoroughly understand the work order (work output – Trial or production) required from the process PC3. Refer all engineering drawings and sketches related to the work output to understand the measurement dimensions, geometric dimensions and shape of the required work output PC4. Identify the required activities which need to be executed in order achieve the final output as per the work order PC5. Ensure that the processes adopted including parameters and process sequences are according to the Work Instructions/ Standard Operating Procedures adopted PC6. Understand the checking method and the frequency as mentioned in the work instructions PC7. Clearly understanding the does and don'ts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors
Understand the process requirements, related equipment and parameters to be set for the process	PC1. Understand the right soldering and brazing methodology and process to be adopted for completing the work order through discussions with the supervisor/ master technician for the new job and reading the process manuals/ Work Instructions/Standard Operating Procedures for the production job PC2. Understand the process parameters like temperature, pressure, Electrode/ rod type, electrode/ rod distance, process cycle time, gas discharge flow rate, flame temperature, flame size etc. before starting the process, as mentioned in the Work Instructions/ SOP manual PC3. Understand the material required and the equipment availability for

ASC/N4201: Understanding work requirements and setting up the apparatus for soldering and brazing

	executing the activity PC4. Understand the type of torches, brazing guns, brazing alloys, type of flux and solder used for the soldering and brazing process PC5. Understand the application of fixtures, process sequence, poka yoke as applicable
Setup the soldering and the brazing equipment for the process	PC6. Ensure that the required material is procured from the store before starting the welding process PC7. Ensure that the helper/ assistant technician brings the required material and tools before the start of the welding operations PC8. Ensure that the helper/ assistant operator cleans the surface of the soldering rod/ brazing gun, wire reels, flux hoppers to remove dust and any other impurities PC9. Setup the soldering and brazing apparatus as per the selected welding process and the internal SOPs/ Work Instructions and the setting standards for the machine PC10. Ensure that the hopper is filled with the flux to make the flux flow over the brazed joints in the specified manner PC11. Load the brazing wire in the wire reel holder of the brazing apparatus
Escalations of queries on the given job	PC12. Refer the queries to a competent internal specialist if they cannot be resolved by the welder on own PC13. Obtain help or advice from specialist if the problem is outside the area of competence or experience PC14. Confirm self-understanding to the specialist during discussion so that all doubts & queries can be resolved before the actual process execution
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. relevant process standards and procedures followed in the company KA2. different types of products manufactured by the company KA3. Internal processes like store management, inventory management, quality management and key contact points for query resolution
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. sketches and engineering drawings and how to interpret meaningful information from the drawings KB2. dimensions and characteristics of the final product output KB3. different types of soldering and brazing processes and associated equipment KB4. different types of welds and joints KB5. different types of flux/ solder material used for soldering & brazing and their chemical properties KB6. different processes used in brazing, soldering and metallurgy KB7. basic principles of geometric shapes, tolerances and drawing KB8. the impact of various physical parameters like temperature, pressure, , cycle time, electrode distance, gas flow, flame properties on the properties of final output product like durability, strength etc.
Skills (S) [Optional]	

ASC/N4201: Understanding work requirements and setting up the apparatus for soldering and brazing

Element	Skill
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. document information from the sketches and engineering drawings SA2. prepare draft drawings for the final output product SA3. note down observations (if any) related to the welding process SA4. write information documents to internal departments/ internal teams or enter the information in online ERP systems under guidance of the supervisor
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA5. read and interpret engineering drawing and sketches SA6. read and interpret symbols and measurements used in the drawings SA7. read equipment manuals and process documents to understand the equipment and processes better SA8. read internal information documents sent by internal teams
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA9. discuss task lists, schedules and activities with the supervisor SA10. effectively communicate with the team members SA11. question the shop supervisor in order to understand the nature of the problem and to clarify queries SA12. attentively listen with full attention and comprehend the information given by the speaker
B. Professional Skills	**Plan and Organize**
	The user/individual on the job needs to know and understand how to: SB1. plan and organize the work order and jobs received from the supervisor SB2. organize all process/ equipment manuals so that sorting/ accessing information is easy SB3. support the supervisor in scheduling tasks for helper
	Judgment and Critical Thinking
	The user/individual on the job needs to know and understand how to: SB4. use common sense and make judgments during day to day basis SB5. use reasoning skills to identify and resolve basic problems SB6. use intuition to detect any potential problems which could arise during operations SB7. use acquired knowledge of the process for new developments , trials
	Desire to learn and take initiatives
	The user/individual on the job needs to know and understand how to: SB8. follow instructions and work on areas of improvement identified SB9. complete the assigned tasks with minimum supervision SB10. complete the job defined by the supervisor within the timelines & quality norms
	Problem Solving and Decision making

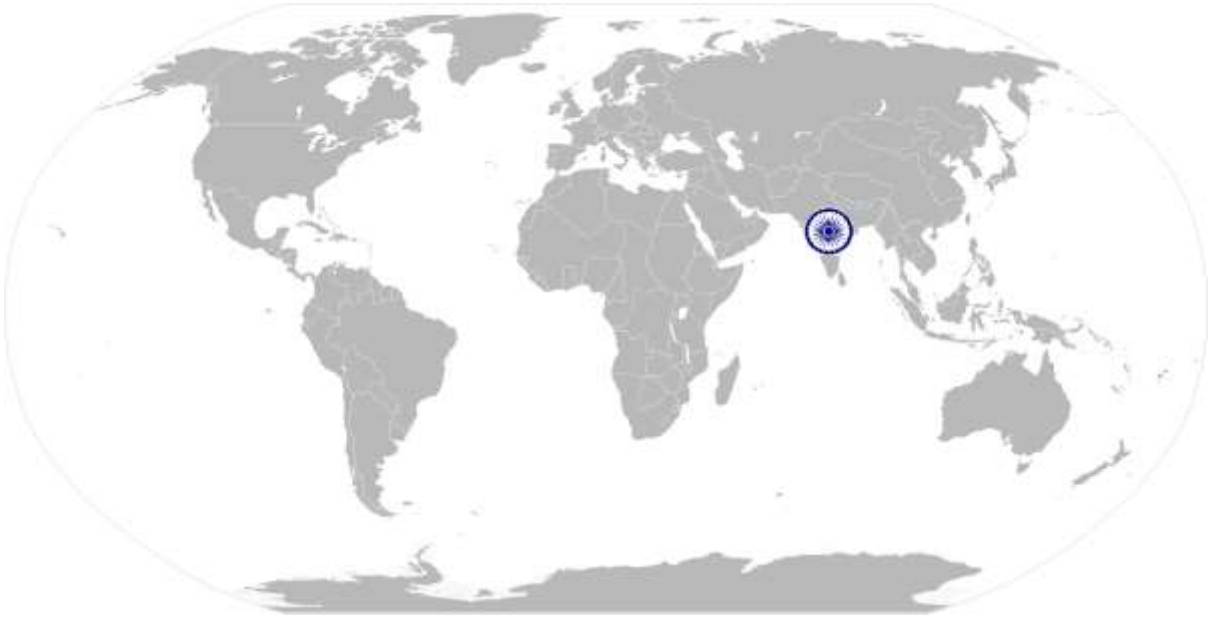
ASC/N4201: Understanding work requirements and setting up the apparatus for soldering and brazing

	The user/individual on the job needs to know and understand how to: SB11. detect problems in day to day tasks with keen observations SB12. support supervisor in using specific problem solving techniques and detailing out the problems SB13. discuss possible solution with the supervisor for problem solving SB14. make decisions in emergency conditions in case the supervisor is not available(as per the authority matrix defined by the organization)

NOS Version Control

NOS Code	**ASC/N 4201**		
Credits(NSQF)	**TBD**	**Version number**	**1**
Industry	**Automotive**	**Drafted on**	**15/10/2013**
Industry Sub-sector	**Manufacturing**	**Last reviewed on**	**15/11/2013**
Occupation	**Soldering/ Brazing**	**Next review date**	**15/11/2015**

National Occupational Standards



Overview

This unit is about conducting the actual soldering and brazing process for the selected work pieces (Jigs) as per the given work order and the standards specified by the organization

National Occupational Standard

ASC/N4202: Conduct the brazing and soldering process to join the work pieces

Unit Code	ASC/N4202
Unit Title (Task)	**Conduct the soldering and brazingprocess to join the work pieces**
Description	This NOS is about conducting the soldering and brazing operation as per the methodology selected and the Standard Operating Procedures defined by the Organization
Scope	The technician will be responsible for • installing the work pieces • conducting actual soldering and brazing process • monitoring process parameters The job holder will cover all types soldering and brazingmethods for joining auto components and vehicle body. The role holder will interact with the assembly line, paint shop, maintenance team and material management team
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Installing the work pieces and equipment for the soldering and brazing process	PC1. Hold the parts (Jigs) which need to be soldered/ brazed together using a clamp and align them as per the job requirement so that the work pieces do not fall down/ turn PC2. Install the work pieces on the soldering and brazing apparatus keeping in mind the electrodes distance, contact area, pressure, temperature application, speed of gas flow etc. as specified in the Welding SOP/ Control plan Documents/Work Instructions PC3. Check for operation of core equipment like brazing gun, soldering iron/ rod, gas cylinders and gas discharge guns as per setup documentation/ work instructions/ SOP
Conduct the actual soldering process	PC4. Apply the solder in a molten condition on the parts, joints/ work pieces which need to be soldered together PC5. Heat the soldering rods/ irons to be desired temperature required for soldering process PC6. Apply the heated soldering rod by keeping it at a distance and angle as specified in the work instructions/ SOP PC7. Ensure that the solder flux is melting at the right place and bonding the work pieces as per requirement PC8. Upon completion of the process, remove the rod from the metal contact and clean the tip of the soldering rod/ iron to remove any excess metal and impurities
Conduct the actual brazing process	PC9. Verify the connections of the Oxygen Acetylene cylinder and check the operations of the valves and torch PC10. Turn on the gas cylinder regulator value to regulate the flow of brazing gases like oxygen & acetylene in the brazing gun and ensure that the flame is produced of the required temperature PC11. Regulate the electric current, voltage and process cycle time as per the process requirement PC12. Ensure that the brazing torch is uniformly moved across the area

ASC/N4202: Conduct the brazing and soldering process to join the work pieces

	under brazing and melts the brass wire/ molten alloy to join the work pieces which were clamped together PC13. Remove the brazed joint and dip it in cold water/ coolant to cool the joint. Dipping also ensures that in case there is a leakage in the joint, the brazing operator can observe air bubbles in the cooling tank
Monitor process parameters to ensure error free soldering and brazing process	PC14. Monitor the soldering and brazing process (Pressure, Temperature, gas discharge flow, iron/ rod/ electrode force, electrode distance etc.) by observing the readings on the panels/ measuring instruments to prevent any harm to the work pieces due to overheating, burning, over melting, change in applied pressure etc. PC15. Ensure that the Assistant Operators/ helpers note down the observations in the prescribed format PC16. Observe and analyze any irregularity in the process and take preventive steps so that the overall quality of the joint is as per the desired standards PC17. Inform the supervisor of any irregularity in process/ equipment malfunctioning PC18. Ensure frequency of setting, checking, recording as per WI
Measure the two parts (work pieces) welded and remove welding inconsistency	PC19. Measure the final welded piece and compare the dimensions as prescribed in the work order engineering drawing PC20. In case the parts are not as per the given measurements, ensure that the assistant operators/ helpers remove extra material by using chippers, grinders etc. PC21. In case of any dents or bulges, ensure hammering of the bulges to give the work pieces the desired shape PC22. Keep the supervisor informed of any inconsistency in the welding process, quality issues etc. so that the same can be dealt immediately
Knowledge and Understanding (K)w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. relevant manufacturing standards and procedures followed in the company KA2. different types of products manufactured by the company KA3. functional processes like Procurement, Store management, inventory management, quality management and key contact points for query resolution KA4. quality norms and standards prescribed in the Quality documentation by the organization for welding& the specified job
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. different types of soldering and brazing processes KB2. different types of joints used and their metallurgical properties KB3. different cleaning methods for soldering irons, brazing rods,

ASC/N4202: Conduct the brazing and soldering process to join the work pieces

	torch tips, electrodes, metal surfaces etc. KB4. metallurgical properties of the work pieces under soldering/ brazing KB5. the methods of using instruments like Vernier calipers, Micrometres, rulers and other inspection tools KB6. various national and international welding standards and symbols KB7. how to read and interpret sketches & engineering drawings KB8. how to visually represent the final product output and hence decide on the key steps to be followed for soldering and brazing KB9. different types of defects in soldering/ brazing and their impact KB10. potential health and safety hazards and related Safety precautions to be undertaken during the brazing and soldering process KB11. basic chemical properties of material used for electrodes, flux, brazing gases etc. KB12. basic knowledge of electrical laws and working of welding transformers, capacitors etc.
Skills (S)w.r.t. the scope	
Elements	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. document information from the sketches and engineering drawings SA2. note measurements, equipment panel readings for various process parameters in the required reporting formats
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret engineering drawing and sketches SA4. read equipment manuals and process documents to understand the equipment and processes better SA5. read internal information documents sent by internal customers (other functions within the organization)for the equipment in the plant area SA6. read parameter reading on various types of monitoring panels
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA7. discuss task lists, schedules and activities with the supervisor effectively communicate with the team members SA8. question the shop supervisor in order to understand the nature of the problem and to clarify queries SA9. attentively listen with full attention and comprehend the information given by the speaker
B. Professional Skills	**Plan and Organize**

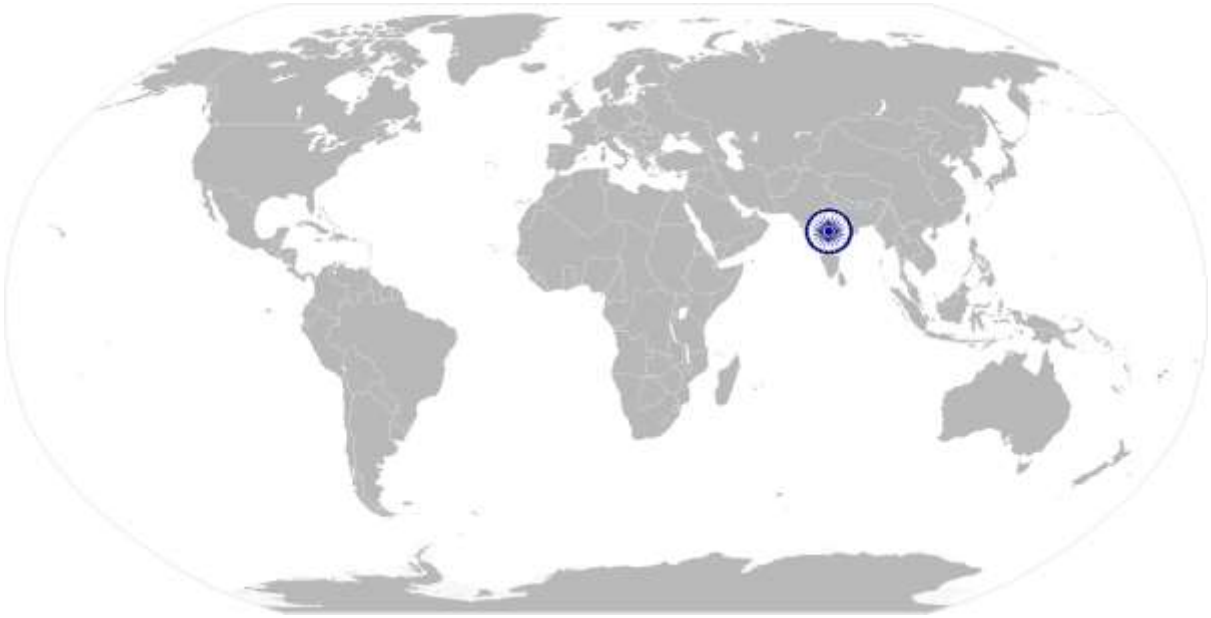
ASC/N4202: Conduct the brazing and soldering process to join the work pieces

	The user/individual on the job needs to know and understand how to: SB1. plan and organize the work order and jobs received from the supervisor SB2. organize all process/ equipment manuals so that sorting/ accessing information is easy SB3. support the supervisor in scheduling tasks for helper and assistant operator
	Judgment and Critical Thinking
	The user/individual on the job needs to know and understand how to: SB4. use common sense and make judgments during day to day basis SB5. use reasoning skills to identify and resolve basic problems SB6. use intuition to detect any potential problems which could arise during operations
	Desire to learn and take initiatives
	The user/individual on the job needs to know and understand how to: SB7. follow instructions and work on areas of improvement identified SB8. complete the assigned tasks with minimum supervision SB9. complete the job defined by the supervisor within the timelines and quality norms
	Problem Solvingand Decision making
	The user/individual on the job needs to know and understand how to: SB10. how to detect problems in day to day activities SB11. support supervisor in using specific problem solving techniques and detailing out the problems SB12. discuss possible solution with the supervisor for problem solving SB13. make decisions in emergency conditions in case the supervisor is not available(as per the authority matrix defined by the organization) SB14. support the supervisor and master technique in problem solving using specific problem solving techniques
	Quality Consciousness
	The user/individual on the job needs to know and understand how to: SB15. identify defective parts in the manufacturing line by SB16. comparing manufactured pieces with the specified work standard SB17. guide the helper and the assistant operator in maintaining the quality SB18. quality Standards as described in the internal Quality Manual SB19. relate the impact of various processes and parameters the product quality

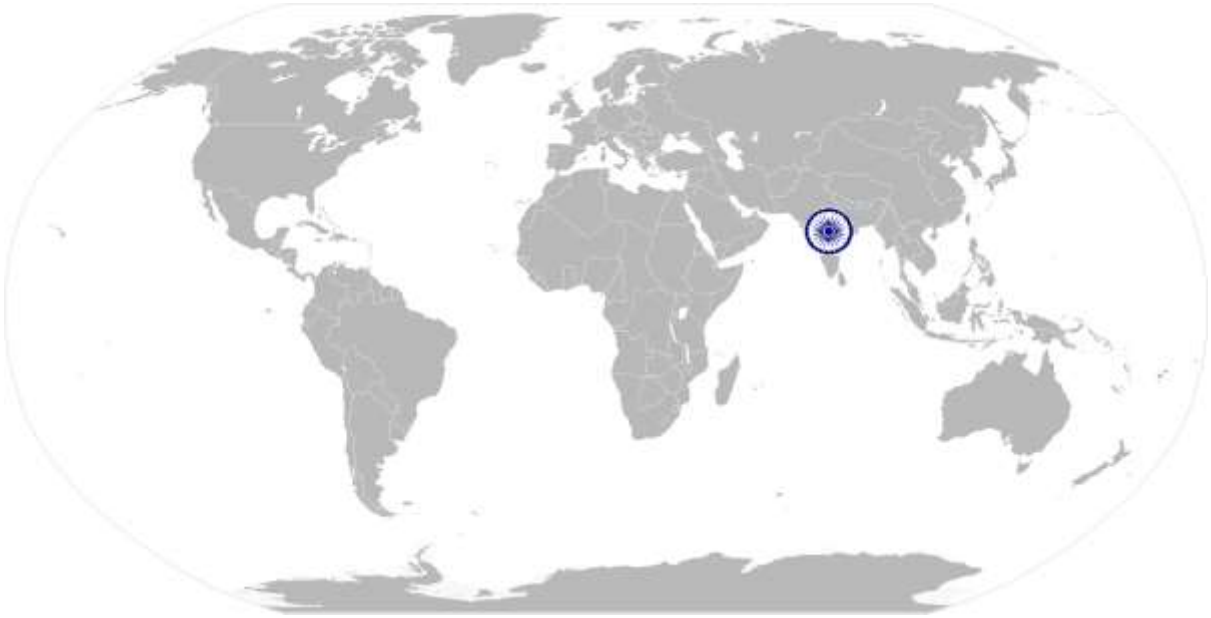
ASC/N4202: Conduct the brazing and soldering process to join the work pieces

NOS Version Control

NOS Code	ASC/N4202		
Credits(NSQF)	TBD	Version number	1
Industry	Automotive	Drafted on	15/10/2013
Industry Sub-sector	Manufacturing	Last reviewed on	15/11/2013
Occupation	Soldering/ Brazing	Next review date	15/11/2015



National Occupational Standards



Overview

This unit is about conducting Quality Checks and inspection of the finished products produced and repair the bad quality items produced in the manufacturing process

ASC/N4203: Ensure completion of post operations activities of inspection, storage and maintenance

National Occupational Standard

Unit Code	ASC/N4203
Unit Title (Task)	**Ensure completion of post operations activities of inspection, storage and maintenance**
Description	This NOS unit is about inspecting the finished goods produced for any damages, deformities and Further repairing the parts produced so that the damaged/ defective pieces can be corrected and right quality components are supplied to 1. The customer/ end user 2. Internal manufacturing team
Scope	The technician will be responsible for • inspection of finished goods • maintain records of production and quality The job holder will cover all types soldering and brazing methods for joining auto components and vehicle body. The role holder will interact with the assembly line, paint shop, maintenance team and material management team
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Inspection of finished goods to detect any deviations from the product design	PC1. Ensure inspection of output products at defined frequency by comparing the dimensions of the output pieces with the specifications of the finished product using devices like micrometers, Vernier calipers, gauges, rulers and any other inspection equipment PC2. Compare texture, color, surface properties, hardness and strength with the given product specifications described the in work order/ Work Instructions PC3. Separate the defective pieces into two categories – pieces which can be repaired/ modified and pieces which are beyond repair by putting tags/ markings on the soldered/ brazed jig/ work piece surface PC4. Ensure that the pieces which are not OK and not meeting the specified standards and cannot be repaired are discarded PC5. Escalate all issues related to change in visual parameters, colour, surface properties, spots, hardness etc so that the manufacturing equipment can be reset to achieve the specified output
Maintain records for production and defective pieces	PC6. Ensure the unit wise production data is captured in the prescribed format PC7. Ensure that the production log sheets are filled correctly at the end of the shift by the Assistant operator PC8. Maintain data records for quality defects and pieces which are beyond repair PC9. Maintain data of process wise consumption of raw material

ASC/N4203: Ensure completion of post operations activities of inspection, storage and maintenance

Unload and store the Finished Goods	PC10. Ensure that the output pieces are correctly clamped and lifted using suitable equipment like hoist, lifts, crane, etc. PC11. Ensure that there is no damage to the lifted work pieces PC12. Carry the output product to the designated area using hangars, conveyor belts, cranes, forklifts etc. PC13. Ensure that the final OK output pieces are tagged and stored in the correct place/ transported to the next production station as per the process specified in the Standard Operating Procedures /Process flow diagrams
Conduct regular preventive maintenance of equipment	PC14. Check the working of all bearing, rollers, shafts etc and oil all moving parts of the equipment on a periodic basis PC15. Check the working of non moving parts and conduct preventive maintenance to prevent machine failure as per the checklist/ work instructions shared by the maintenance team PC16. Periodically check the equipment calibration status and report any non-conformance to the maintenance teams for rectification
Knowledge and Understanding (K)w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. basic process followed for inspection of the pieces KA2. the Quality Management policy and manual of the organization KA3. relevant standards and procedures followed in the company for the process of maintenance and equipment storage KA4. functional processes like Procurement, Store management, inventory management, quality management and key contact points for query resolution
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. techniques of using measurement instruments like rulers, Vernier calipers, micrometers, gauges and other inspection equipment KB2. guidelines to identify quality defects in work pieces – visual/ test based KB3. methods used for cutting, shearing, hammering, drilling which can repair pieces with minor defects KB4. basic level maintenance and cleaning techniques KB5. Basic knowledge of robotic brazing KB6. various solvents, chemicals, lubricants etc. used during the maintenance processes KB7. procedure for arranging the equipment and spare parts in the prescribed manner including tagging and numbering of machine parts & spares KB8. safety precautions to be taken during cleaning and maintenance activities KB9. basic welding defects and corrective measures KB10. basic level operations of lifting equipment like hoists, cranes, pulley etc. KB11. fundamentals of 5S on the shop floor

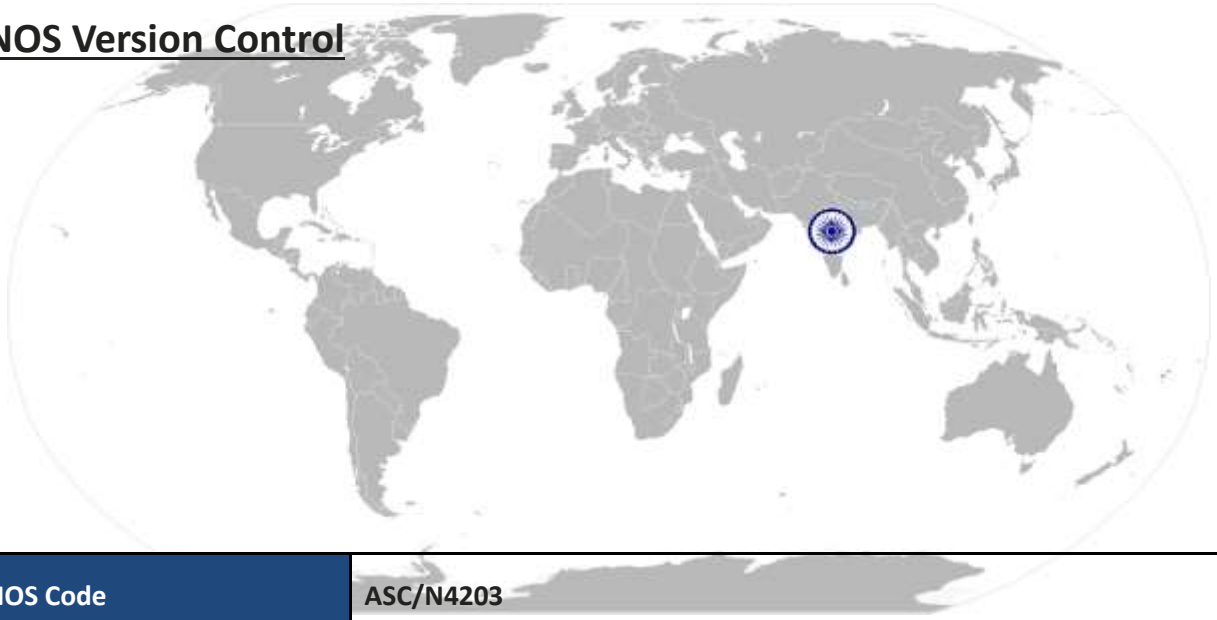
ASC/N4203: Ensure completion of post operations activities of inspection, storage and maintenance

Skills (S)w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. document information from the sketches and engineering drawings SA2. prepare draft drawings for the final output product note down observations (if any) related to the process SA3. write information documents to internal departments/ internal teams or enter the information in online ERP systems under guidance of the supervisor
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA4. read and interpret engineering drawing and sketches SA5. read and interpret symbols and measurements used in the drawings SA6. read equipment manuals and process documents to understand the equipment and processes better SA7. read internal information documents sent by internal teams
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA8. discuss task lists, schedules and activities with the supervisor SA9. effectively communicate with the team members SA10. question the shop supervisor in order to understand the nature of the problem and to clarify queries SA11. attentively listen with full attention and comprehend the information given by the speaker
B. Professional Skills	**Plan and Organize**
	The user/individual on the job needs to know and understand how to: SB1. plan and organize the work order and jobs received from the supervisor SB2. organize all process/ equipment manuals so that sorting/ accessing information is easy SB3. support the supervisor in scheduling tasks for helper and assistant supervisor
	Judgment and Critical Thinking
	The user/individual on the job needs to know and understand how to: SB4. use common sense and make judgments during day to day basis SB5. use reasoning skills to identify and resolve basic problems SB6. use intuition and keen observation to detect any potential problems which could arise during operations
	Desire to learn and take initiatives
	The user/individual on the job needs to know and understand how to:

ASC/N4203: Ensure completion of post operations activities of inspection, storage and maintenance

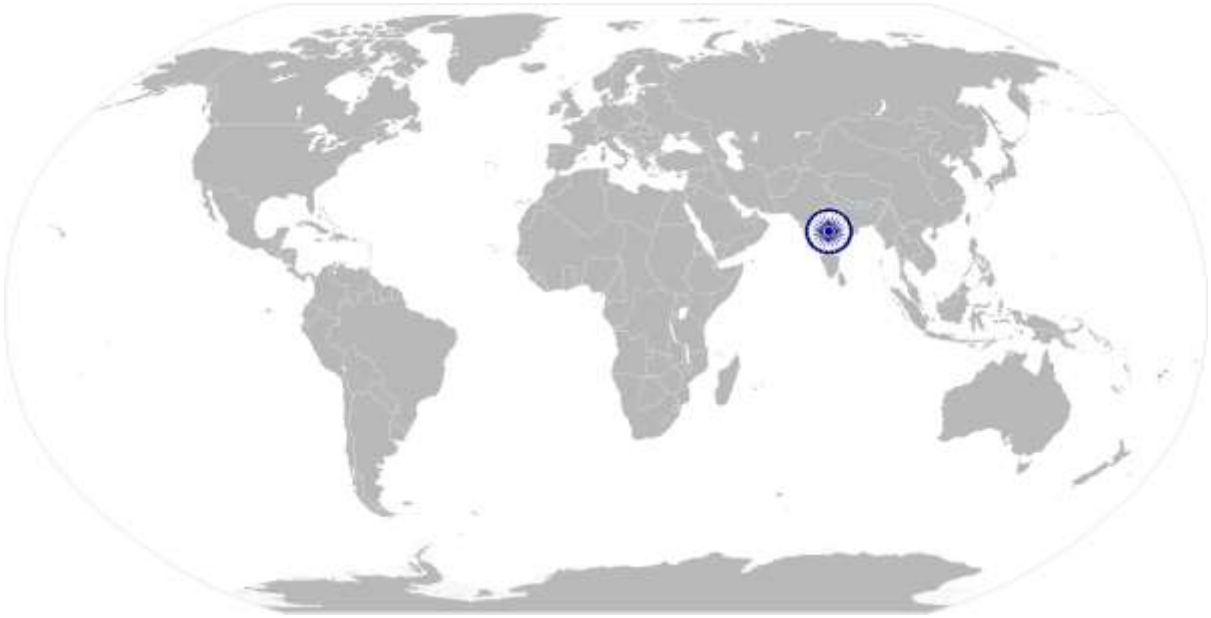
	SB7. follow instructions and work on areas of improvement identified SB8. complete the assigned tasks with minimum supervision SB9. complete the job defined by the supervisor within the timelines and quality norms
	Problem Solving and Decision making
	The user/individual on the job needs to know and understand how to: SB10. detect problems in day to day tasks SB11. support supervisor in using specific problem solving techniques and detailing out the problems SB12. discuss possible solution with the supervisor for problem solving SB13. make decisions in emergency conditions in case the supervisor is not available(as per the authority matrix defined) SB14. work in a CFT on new product development, problem solving

NOS Version Control



NOS Code	ASC/N4203		
Credits(NSQF)	TBD	Version number	1
Industry	Automotive	Drafted on	15/10/2013
Industry Sub-sector	Manufacturing	Last reviewed on	15/11/2013
Occupations	Soldering/Brazing	Next review date	15/11/2015

National Occupational Standards



Overview

This unit is about establishing a Safe, Healthy and Environment friendly workplace

National Occupational Standard

ASC/ N0006A: maintain a healthy and safe working environment at the workplace

Unit Code	ASC/N0006A
Unit Title (Task)	**Maintain a safe and healthy working environment at the work place**
Description	This NOS unit is about creating a Safe and Healthy work place, adhering to the safety guidelines in the working area, following practices which are not impacting the environment in a negative manner
Scope	The role holder will be responsible for • identifying and reporting of risks • creating and sustaining a safe, clean and environment friendly work place This NOS will be applicable to all Automotive sector manufacturing job roles
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Identify and report the risks identified	PC1. Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals ,loud noise PC2. Identify areas in the plant which are potentially hazardous/ unhygienic in nature PC3. Conduct regular checks with support of the maintenance team on machine health to identify potential hazards due to wear and tear of machine PC4. Inform the concerned authorities about the potential risks identified in the processes, workplace area/ layout, materials used etc. PC5. Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations PC6. Create awareness amongst other by sharing information on the identified risks
Create and sustain a Safe, clean and environment friendly work place	PC7. Support the Safety team and the supervisor in creating the risk mitigation plan PC8. Follow the instructions given on the equipment manual describing the operating process of the equipment PC9. Follow the Safety, Health and Environment related practices developed by the organization PC10. Ensure relevant safety boards/ signs are placed on the shop floor PC11. Operate the machine using the recommended Personal Protective Equipment (PPE) and ensure team members also use the related PPEs at the workplace PC12. Maintain a clean and safe working environment near the work place and ensure there is no spillage of chemicals, production waste, oil, solvents etc. PC13. Attend all safety and fire drills to be self aware of safety hazards and preventive techniques

ASC/ N0006A: maintain a healthy and safe working environment at the workplace

	PC14. Maintain high standards of personal hygiene at the work place PC15. Ensure that the waste disposal is done in the designated area and manner as per organization SOP. PC16. Inform appropriately the medical officer/ HR in case of self or an employee's illness of contagious nature so that preventive actions can be planned for others
Knowledge and Understanding (K)w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA1. relevant standards, procedures and policies related to Health, Safety and Environment followed in the company KA2. emergency handling procedures & hierarchy for escalation
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. basic knowledge of Safety procedures(fire fighting, first aid) within the organization KB2. basic knowledge of various types of PPEs and their usage KB3. basic knowledge of risks/hazards associated with each occupation in the organization KB4. knowledge of personal hygiene and how an individual an contribute towards creating a highly safe and clean working environment
Skills (S)w.r.t. the scope	
Element	**Skills**
C. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. write basic level notes and observations
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. read safety instructions put up across the plant premises SA3. read safety precautions mentioned in equipment manuals and panels to understand the potential risks associated
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. effectively communicate information to team members SA5. Inform employees in the plant and concerned functions about events, incidents & potential risks observed related to Safety, Health and Environment. SA6. question operator/ supervisor in order to understand the safety related issues SA7. attentively listen with full attention and comprehend the information given by the speaker during safety drills and training programs

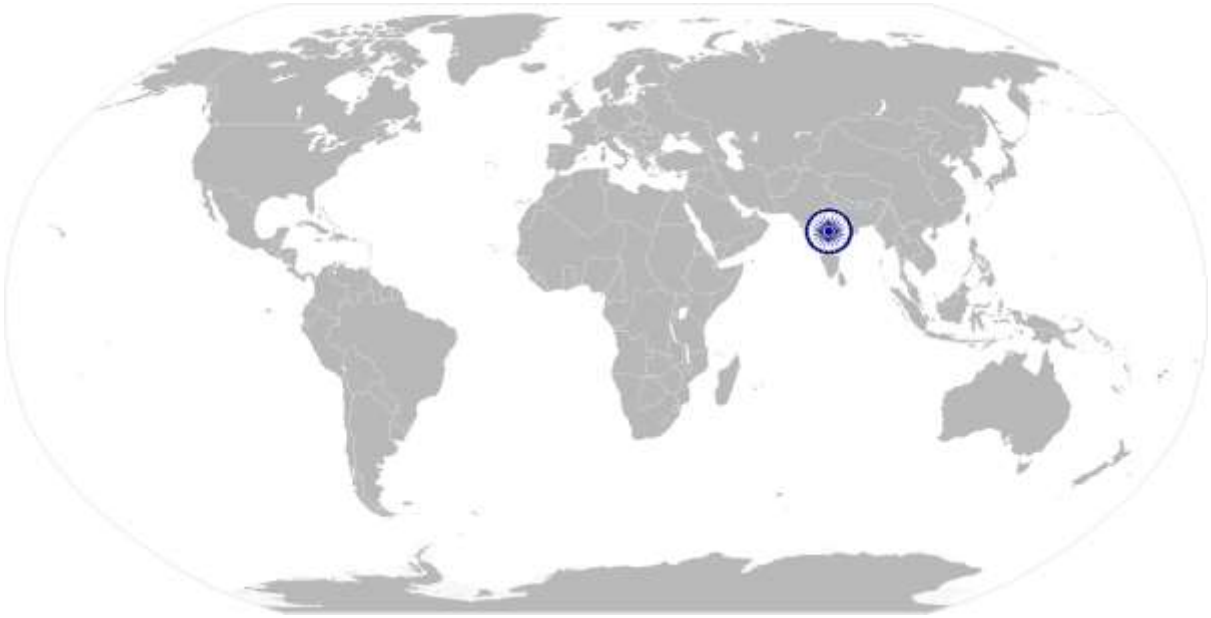
ASC/ N0006A: maintain a healthy and safe working environment at the workplace

D. Professional Skills	Judgmental Thinking
	The user/individual on the job needs to know and understand how to: SB1. use common sense and make judgments during day to day basis SB2. use reasoning skills to identify and resolve basic problems

NOS Version Control

NOS Code	ASC/ N0006A		
Credits(NSQF)	TBD	Version number	1
Industry	Automotive	Drafted on	15/8/2013
Industry Sub-sector	Manufacturing	Last reviewed on	25/8/2013
Occupation	All	Next review date	25/8/2013

National Occupational Standard



Overview

This unit is about the understanding all principles of 5S and follow the given guidelines to ensure a clean and efficient working environment in the organization

ASC/N0021: Maintaining 5S at the work premises

National Occupational Standard

Unit Code	ASC/N0021
Unit Title (Task)	**Maintaining 5S in the work premises**
Description	This NOS is about ensuring all 5 S activities both at the shop floor and the office area to facilitate increase in work productivity
Scope	The individual needs to • Ensure sorting, streamlining & organizing, storage and documentation, cleaning, standardization and sustenance across the plant and office premises of the organization
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Ensure sorting	PC1. Follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the workbenches or work surfaces. PC2. Ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions PC3. Follow the technique of waste disposal and waste storage in the proper bins as per SOP PC4. Segregate the items which are labelled as red tag items for the process area and keep them in the correct places PC5. Sort the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions PC6. Ensure that areas of material storage areas are not overflowing PC7. Properly stack the various types of boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required PC8. Return the extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area PC9. Follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards
Ensure proper documentation and storage (organizing , streamlining)	PC10. Follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists PC11. Check that the items in the respective areas have been identified as broken or damaged PC12. Follow the given instructions and check for labelling of fluids, oils. lubricants, solvents, chemicals etc. and proper storage of the same to avoid spillage, leakage, fire etc. PC13. Make sure that all material and tools are stored in the designated

ASC/N0021: Maintaining 5S at the work premises

	places and in the manner indicated in the 5S instructions
Ensure cleaning of self and the work place	PC14. Check whether safety glasses are clean and in good condition PC15. Keep all outside surfaces of recycling containers are clean PC16. Ensure that the area has floors swept, machinery clean and generally clean. In case of cleaning, ensure that proper displays are maintained on the floor which indicate potential safety hazards PC17. Check whether all hoses, cabling & wires are clean, in good condition and clamped to avoid any mishap or mix up PC18. Ensure workbenches and work surfaces are clean and in good condition PC19. Follow the cleaning schedule for the lighting system to ensure proper illumination PC20. Store the cleaning material and equipment in the correct location and in good condition PC21. Ensure self-cleanliness - clean uniform, clean shoes, clean gloves, clean helmets, personal hygiene
Ensure sustenance	PC22. Follow the daily cleaning standards and schedules to create a clean working environment PC23. Attend all training programs for employees on 5 S PC24. Support the team during the audit of 5 S PC25. Participate actively in employee work groups on 5S and encourage team members for active participation PC26. Follow the guidelines for What to do and What not to do to build sustainability in 5S as mentioned in the 5S check lists/ work instructions
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organizational Context (Knowledge of the company / organization and its processes)	The user/individual on the job needs to know and understand: KA3. relevant standards, procedures and policies related to 5S followed in the company
B. Technical Knowledge	The user/individual on the job needs to : KB5. have basic knowledge of 5S procedures KB6. know various types 5s practices followed in various areas KB7. understand the 5S checklists provided in the department/ team KB8. have skills to identify useful & non useful items KB9. have knowledge of labels , signs & colours used as indicators KB10. Have knowledge on how to sort and store various types of tools, equipment, material etc. KB11. know , how to identify various types of waste products KB12. understand the impact of waste/ dirt/ dust/unwanted substances on the process/ environment/ machinery/ human body

ASC/N0021: Maintaining 5S at the work premises

	KB13. have knowledge of best ways of cleaning & waste disposal KB14. understand the importance of standardization in processes KB15. understand the importance of sustainability in 5S KB16. have knowledge of TQM process KB17. have knowledge of various materials and storage norms KB18. understand visual controls, symbols, graphs etc.
Skills (S)w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA8. write basic level notes and observations SA9. note down observations (if any) related to the process SA10. write information documents to internal departments/ internal teams
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA11. read 5S instructions put up across the plant premises
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA12. effectively communicate information to team members inform employees in the plant and concerned functions about 5S SA13. question the process head in order to understand the 5S related issues SA14. attentively listen with full attention and comprehend the information given by the speaker during 5S training programs
B. Professional Skills	**Judgmental Thinking**
	The user/individual on the job needs to know and understand how to: SB3. use common sense and make judgments during day to day basis SB4. use reasoning skills to identify and resolve basic problems using 5S
	Persuasion
	The user/ individual on the jobs needs to know and understand how to: SB5. persuade co team members to follow 5 S SB6. ensure that the co team members understand the importance of using 5 S tool
	Creativity
	The user/individual on the job needs to know and understand how to : SB7. use innovative skills to perform and manage 5 S activities at the work desk and the shop floor SB8. exhibit inquisitive behaviour to seek feedback and question on the existing set patterns of work
	Self –Discipline

ASC/N0021: Maintaining 5S at the work premises

	The user/individual on the job needs to know and understand how to: SB9. do what is right, not what is a popular practices SB10. follow shop floor rules& regulations and avoid deviations; make 5S an integral way of life SB11. ensure self-cleanliness on a daily basis SB12. demonstrate the will to keep the work area in a clean and orderly manner

NOS Version Control

NOS Code	**ASC/N0021**		
Credits(NSQF)	**TBD**	**Version number**	**1**
Industry	**Automotive**	**Drafted on**	**1/03/2014**
Industry Sub-sector	**Manufacturing/ R&D**	**Last reviewed on**	**15/03/2014**
Occupation	**All**	**Next review date**	**15/03/2016**

Criteria for assessment of Trainees

JOB ROLE	Soldering & Brazing Technician or Operator L4
Qualification Pack	ASC/Q 4201
No. Of NOS	3 Role specific ,2 generic

NOS Title/ NOS Elements	NOS & Performance Criterion Description	Marks allocation	
ASC/N 4201	**Understand the work requirements & set up the process**	**Viva**	**Practical**
Identify the right drawing and process to be used for soldering and brazing process	PC1. Check the version of the engineering drawing provided and select the latest version of the available engineering drawing so that the final measurements and design is available with the team PC2. Thoroughly understand the work order (work output – Trial or production) required from the process PC3. Refer all engineering drawings and sketches related to the work output to understand the measurement dimensions, geometric dimensions and shape of the required work output PC4. Identify the required activities which need to be executed in order achieve the final output as per the work order PC5. Ensure that the processes adopted including parameters and process sequences are according to the Work Instructions/ Standard Operating Procedures adopted PC6. Understand the checking method and the frequency as mentioned in the work instructions PC7. Clearly understanding the does and don'ts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors	10	30
Understand the process requirements, related equipment and parameters to be set for the process	PC8. Understand the right soldering and brazing methodology and process to be adopted for completing the work order through discussions with the supervisor/ master technician for the new job and reading the process manuals/ Work Instructions/Standard Operating procedures for the production job PC9. Understand the process parameters like temperature, pressure, Electrode/ rod type, electrode/ rod distance, process cycle time, gas discharge flow rate, flame temperature, flame size etc. before starting the process, as mentioned in the Work Instructions/ SOP manual PC10. Understand the material required and the equipment availability for executing the activity PC11. Understand the type of torches, brazing guns, brazing alloys, type of flux and solder used for the soldering and brazing process	10	30

	PC12. Understand the application of fixtures, process sequence, poka yoke as applicable		
Setup the soldering and the brazing equipment for the process	PC13. Ensure that the required material is procured from the store before starting the welding process PC14. Ensure that the helper/ assistant technician brings the required material and tools before the start of the welding operations PC15. Ensure that the helper/ assistant operator cleans the surface of the soldering rod/ brazing gun, wire reels, flux hoppers to remove dust and any other impurities PC16. Setup the soldering and brazing apparatus as per the selected welding process and the internal SOPs/ Work Instructions and the setting standards for the machine PC17. Ensure that the hopper is filled with the flux to make the flux flow over the brazed joints in the specified manner PC18. Load the brazing wire in the wire reel holder of the brazing apparatus	20	40
Escalations of queries on the given job	PC19. Refer the queries to a competent internal specialist if they cannot be resolved by the welder on own PC20. Obtain help or advice from specialist if the problem is outside the area of competence or experience PC21. Confirm self-understanding to the specialist during discussion so that all doubts & queries can be resolved before the actual process execution	10	--
	Sub total	**50**	**100**
ASC/N 4202	**Conduct the soldering /Brazing process**	**Viva**	**Practical**
Installing the work pieces and equipment for the soldering and brazing process	PC1. Hold the parts (Jigs) which need to be soldered/ brazed together using a clamp and align them as per the job requirement so that the work pieces do not fall down/ turn PC2. Install the work pieces on the soldering and brazing apparatus keeping in mind the electrodes distance, contact area, pressure, temperature application, speed of gas flow etc. as specified in the Welding SOP/ Control plan Documents/Work Instructions PC3. Check for operation of core equipment like brazing gun, soldering iron/ rod, gas cylinders and gas discharge guns as per setup documentation/ work instructions/ SOP	30	20
Conduct the actual soldering process	PC4. Apply the solder in a molten condition on the parts, joints/ work pieces which need to be soldered together PC5. Heat the soldering rods/ irons to be desired temperature required for soldering process PC6. Apply the heated soldering rod by keeping it at a distance and angle as specified in the work instructions/ SOP PC7. Ensure that the solder flux is melting at the right place and bonding the work pieces as per requirement	10	30

	PC8. Upon completion of the process, remove the rod from the metal contact and clean the tip of the soldering rod/ iron to remove any excess metal and impurities		
Conduct the actual brazing process	PC9. Verify the connections of the Oxygen Acetylene cylinder and check the operations of the valves and torch PC10. Turn on the gas cylinder regulator value to regulate the flow of brazing gases like oxygen & acetylene in the brazing gun and ensure that the flame is produced of the required temperature PC11. Regulate the electric current, voltage and process cycle time as per the process requirement PC12. Ensure that the brazing torch is uniformly moved across the area under brazing and melts the brass wire/ molten alloy to join the work pieces which were clamped together **PC13.** Remove the brazed joint and dip it in cold water/ coolant to cool the joint. Dipping also ensures that in case there is a leakage in the joint, the brazing operator can observe air bubbles in the cooling tank	20	50
Monitor process parameters to ensure error free soldering and brazing process	PC14. Monitor the soldering and brazing process (Pressure, Temperature, gas discharge flow, iron/ rod/ electrode force, electrode distance etc.) by observing the readings on the panels/ measuring instruments to prevent any harm to the work pieces due to overheating, burning, over melting, change in applied pressure etc. PC15. Ensure that the Assistant Operators/ helpers note down the observations in the prescribed format PC16. Observe and analyze any irregularity in the process and take preventive steps so that the overall quality of the joint is as per the desired standards PC17. Inform the supervisor of any irregularity in process/ equipment malfunctioning PC18. Ensure frequency of setting, checking, recording as per WI	20	40
Measure the two parts (work pieces) welded and remove welding inconsistency	PC19. Measure the final welded piece and compare the dimensions as prescribed in the work order engineering drawing PC20. In case the parts are not as per the given measurements, ensure that the assistant operators/ helpers remove extra material by using chippers, grinders etc. PC21. In case of any dents or bulges, ensure hammering of the bulges to give the work pieces the desired shape PC22. Keep the supervisor informed of any inconsistency in the welding process, quality issues etc. so that the same can be dealt immediately	20	20
	subtotal	**100**	**160**

ASC/N4203	Ensure completion of all post processes	viva	Practical
Maintain records for production and defective pieces	PC1. Ensure the unit wise production data is captured in the prescribed format PC2. Ensure that the production log sheets are filled correctly at the end of the shift by the Assistant operator PC3. Maintain data records for quality defects and pieces which are beyond repair PC4. Maintain data of process wise consumption of raw material	10	20
Unload and store the Finished Goods	PC5. Ensure that the output pieces are correctly clamped and lifted using suitable equipment like hoist, lifts, crane, etc. PC6. Ensure that there is no damage to the lifted work pieces PC7. Carry the output product to the designated area using hangars, conveyor belts, cranes, forklifts etc. PC8. Ensure that the final OK output pieces are tagged and stored in the correct place/ transported to the next production station as per the process specified in the Standard Operating Procedures /Process flow diagrams	20	50
Conduct regular preventive maintenance of equipments	PC9. Check the working of all bearing, rollers, shafts etc and oil all moving parts of the equipment on a periodic basis PC10. Check the working of non moving parts and conduct preventive maintenance to prevent machine failure as per the checklist/ work instructions shared by the maintenance team PC11. Periodically check the equipment calibration status and report any non-conformance to the maintenance teams for rectification	20	50
	subtotal	**50**	**120**
ASC/N 0006	**Maintain safe , healthy environment friendly workplace**	**Viva**	**Practical**
Identify and report the risks identified	PC1. Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals ,loud noise PC2. Inform the concerned authorities about the potential risks identified in the processes, workplace area/ layout, materials used etc. PC3. Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations PC4. Create awareness amongst other by sharing information on the identified risks	20	40
Create and sustain a Safe, clean and environment friendly work place	PC5. Follow the instructions given on the equipment manual describing the operating process of the equipment PC6. Follow the Safety, Health and Environment related practices developed by the organization		

	PC7. Operate the machine using the recommended Personal Protective Equipment (PPE) PC8. Maintain a clean and safe working environment near the work place and ensure there is no spillage of chemicals, production waste, oil, solvents etc. PC9. Maintain high standards of personal hygiene at the work place PC10. Ensure that the waste disposal is done in the designated area and manner as per organization SOP. PC11. Inform appropriately the medical officer/ HR in case of self or an employee's illness of contagious nature so that preventive actions can be planned for others	50	40
	subtotal	70	80
ASC / N 0021	**Maintain 5 S activities at the workplace**	**Viva**	**practical**
Ensure sorting	C1. Follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the workbenches or work surfaces. PC2. Ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions PC3. Follow the technique of waste disposal and waste storage in the proper bins as per SOP PC4. Segregate the items which are labelled as red tag items for the process area and keep them in the correct places PC5. Sort the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions PC6. Ensure that areas of material storage areas are not overflowing PC7. Properly stack the various types of boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required PC8. Return the extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area PC9. Follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards	10 10	20 20
Ensure proper documentation and storage (organizing , streamlining)	PC10. Follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists PC11. Check that the items in the respective areas have been identified as broken or damaged PC12. Follow the given instructions and check for labelling of fluids, oils. lubricants, solvents, chemicals etc. and proper storage of the same to avoid spillage, leakage, fire etc. PC13. Make sure that all material and tools are stored in the	10	20

	designated places and in the manner indicated in the 5S instructions		
Ensure cleaning of self and the work place	PC14. Check whether safety glasses are clean and in good condition PC15. Keep all outside surfaces of recycling containers are clean PC16. Ensure that the area has floors swept, machinery clean and generally clean. In case of cleaning, ensure that proper displays are maintained on the floor which indicate potential safety hazards PC17. Check whether all hoses, cabling & wires are clean, in good condition and clamped to avoid any mishap or mix up PC18. Ensure workbenches and work surfaces are clean and in good condition PC19. Follow the cleaning schedule for the lighting system to ensure proper illumination PC20. Store the cleaning material and equipment in the correct location and in good condition PC21. Ensure self-cleanliness - clean uniform, clean shoes, clean gloves, clean helmets, personal hygiene	10	40
Ensure sustenance	PC22. Follow the daily cleaning standards and schedules to create a clean working environment PC23. Attend all training programs for employees on 5 S PC24. Support the team during the audit of 5 S PC25. Participate actively in employee work groups on 5S and encourage team members for active participation PC26. Follow the guidelines for What to do and What not to do to build sustainability in 5S as mentioned in the 5S check lists/ work instructions	10	20
	Sub total	**50**	**120**
	Total	**320**	**580**