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-Machining Technician / CNC Operator L4

SECTOR: AUTOMOTIVE

SUB-SECTOR: MANUFACTURING

OCCUPATION: MACHINING

JOB ROLE: MACHINING TECHNICIAN

REFERENCE ID: ASC/Q3503

ALIGNED TO:NCO-2004/8211.10

Machining Technician: The role entails setting up and operating a variety of machine tools to produce precision parts, tools and instruments.

Brief Job Description: Machining Technician is also known as Machinist or CNC machine operator. The role covers operations of different machine tools performed both manually and through automatic/ CNC machines/ robots. This role primarily involves all kinds of machining and in-line inspection activities for quality verification, ad hoc repair work, change of worn out parts, gauging and de-burring activities

Personal Attributes: The individual should be detailed oriented, observant; should have the ability of operation monitoring i.e., observing gauges , dials etc., good level of hand eye coordination, two hand coordination, maintaining arm steadiness, ability to quickly move hand to grasp and assemble objects (Dexterity), reading, writing and communication skills and sensitivity towards safety for self and equipment

Job Details

Qualifications Pack Code	**ASC/Q3503**		
Job Role	**Machining Technician**		
Credits(NSQF)	**TBD**	**Version number**	**1.1**
Industry	**Automotive**	**Drafted on**	**5/10/2013**
Sub-sector	**Manufacturing**	**Last reviewed on**	**30/10/2013**
Occupation	**Machining**	**Next review date**	**30/10/2015**

Job Role	**Machining Technician**
Role Description	Responsible for understanding the component requirements, machining the part as per work instructions/ standard operating procedures As a CNC Operator, this role will select the required program from the list in order to machine the parts as per the work instructions, support the machine setter in programming and setting of the tools and conduct process test as per requirement
NSQF level	4
Minimum Educational Qualifications	ITI – Mechanical/ Machine Technology
Maximum Educational Qualifications	Diploma in Mechanical Engineering
Training (Suggested but not mandatory)	• Different types of machining activities (like Turning, Milling, Grinding, Boring, Broaching, Honing, Facing, Shaping, Blanking, Shaving, Hobbing etc.) and usage of fixtures tools etc. • 5S and Safety • Process Documentation
Experience	3-4 years in various machining activities
Occupational Standards (OS)	ASC/N 3507:Carrying out pre-machining activities ASC/N 3508: Performing different kinds of machining operations ASC/N 3509: Conducting all post machining operations ASC/N0006A: Maintain a healthy and safe working environment at the workplace

	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
5 S	Technique of maintaining orderliness –Japanese terminology
CP	Control Plan
WI	Work Instructions

National Occupational Standards

Overview

This Occupational Standard describes the knowledge, understanding and skills required of an individual to carry out general machining activities as well as machining activities of specific precision nature.

National Occupational Standard

ASC/ N 3507: Carrying out pre-machining activities

Unit Code	ASC/ N 3507
Unit Title (Task)	Carrying out pre-machining activities
Description	This NOS unit is about performing all pre-machining activities either manually or through specialized techniques as per the given work order and the standards specified by the organization.
Scope	The Machining Technician will be responsible for • understanding the sketches and process requirements • supporting the master technician/ machine setter in CNC programming • conducting the pre machining activities like wheel dressing, grinding The job holder will cover different types of machining activities like hobbing, honing, broaching, milling, grinding, turning, shaping for creating auto components. The role holder will interact with the heat treatment, maintenance team and material management team
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
A. Understanding the component requirements	PC1. Before starting the machining operations, obtain a detailed and thorough understanding of the task at hand: ○ understand the output product requirement by reading the engineering drawing specified in the work instructions/ work order ○ reading the control panel instructions/ job orders to determine the correct output product specifications ○ understanding the tooling instructions (fixtures, cutting tools, jigs etc.) as specified in the Operating Manual/ Work Instructions or Standard Operating Procedures ○ selection of proper coolant and lubricant required for machining the required component
B. Checking the dimensions for the component	PC2. Set the machine stops or guides or programmes as per the specified lengths indicated through scales or work instructions PC3. Measure and mark reference points/ cutting lines on the work pieces, using compasses, callipers, rulers and other measuring tools PC4. Understand acceptance requirements/ limits of machining e.g. surface finish, specific orientation, gauge inspection etc. PC5. Understand any other specific requirement for machining
C. Programming the machine for specific tool operations	PC6. Assist the Master Machining Technician in programming the CNC/ numerically controlled machine as per the work instructions PC7. Set the right material removal rate while programming the machine as per specified requirements E.g. for Hobbing set the ratio for the rotation of the shafts/spindle which determine the number of teeth made on the work piece PC8. Discuss technical matters related to machine programming with engineer/ supervisory/ personnel in the maintenance team
D. Performing wheel dressing activities for grinding	For manual wheel dressing activities for grinding operations perform the following activities: PC9. always put machine guards in place before turning on grinding wheel

ASC/ N 3507: Carrying out pre-machining activities

operations	PC10. run the wheels for a least one minute before actual work begins PC11. ensure proper balancing and dressing of wheels before use PC12. select and mount grinding wheels on machine, according to work instructions PC13. using hand tools and applying knowledge of abrasives and grinding procedures PC14. always use eye protection while performing these activities
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. relevant standards and procedures followed in the company KA2. different types of products manufactured by the company KA3. different types of machining processes/ tools available
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. different types of machining processes KB2. basic fundamentals of machines and mechanics KB3. different types of tools used in the machining process with respect to type of process to be conducted KB4. basic principles of 5 S in manufacturing – Cleaning, sorting, scrap handling etc. KB5. the application of coolant and lubricants KB6. Impact of various machining processes on the final product outcome KB7. basic Arithmetic and calculation methods for tolerance limits KB8. safety guidelines related to different machines
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. write basic level notes and observations SA2. draw basic level geometrical/ mechanical drawings and charts
	Reading skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret workplace related documentation SA4. read and interpret engineering drawings and sketches to understand the dimension of the output product
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA5. discuss task lists and job requirements with co-workers SA6. effectively communicate information to team members SA7. discuss with supervisor in order to understand the nature of the problem SA8. attentively listen with full attention and comprehend the information given by the speaker
B. Professional Skills	**Problem Solving and Decision making**
	The user/individual on the job needs to know and understand how to: SB1. judge when to ask for help from a supervisor

ASC/ N 3507: Carrying out pre-machining activities

	SB2. suggest options to operators in case any issue is observed during operations
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB3. plan work assigned on a daily basis and provide estimates of time required for each piece of work SB4. prioritize actions to achieve required outcomes
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB5. analyse the complexity of work to determine if it can be successfully carried out SB6. ability to visualize the final product from the engineering drawing/ machine drawing, sketch provided by the supervisor SB7. analyse the cause of defects related to e.g. cutting tools, machine, fixtures etc.
	Desire to learn and take initiatives
	The user/individual on the job needs to know and understand how to: SB8. learn from mistakes by analysing and discussing with peers/ seniors SB9. discuss new ideas and participate in new initiatives SB10. follow instructions and work on areas of improvement identified SB11. complete the assigned tasks with minimum supervision SB12. complete the job defined by the supervisor within the timelines and quality norms

NOS Version Control

NOS Code	**ASC/ N 3507**		
Credits(NSQF)	**TBD**	**Version number**	**1**
Industry	**Automotive**	**Drafted on**	**5/09/2013**
Industry Sub-sector	**Manufacturing**	**Last reviewed on**	**15/09/2013**
Occupation	**Machining**	**Next review date**	**15/09/2015**

ASC/ N 3508: Perform different kinds of machining operations

National Occupational Standards

Overview

This Occupational Standard describes the knowledge, understanding and skills required of a Machining Technician in performing different machining activities

ASC/ N 3508: Perform different kinds of machining operations

National Occupational Standard

Unit Code	**ASC/ N 3508**
Unit Title (Task)	**Perform different kinds of machining operations**
Description	This NOS is about carrying out different machining operations
Scope	The Machining Technician will be responsible for • conducting the machining activities like broaching, milling, turning, hobbing etc. • measuring dimensions and inspect work pieces The job holder will cover different types of machining activities like hobbling, honing, broaching, milling, grinding, turning, shaping for creating auto components. The role holder will interact with the heat treatment, maintenance team and material management team

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
A. Setting up machine as per work instructions	PC1. Change the cutting tool of the Special Purpose Machine as per the process requirement PC2. Set-up, adjust machine tools, fixtures/ jigs and cutting tools in order to perform machining operations and keep dimension within the specified tolerance limit specified in the Standard Operating Procedures/ Operating manuals/ Control Panel PC3. Lift the work piece/ metal stock manually or through hoist and position the same securely in the machine using fasteners and hand tools and verify their positions with measuring instruments PC4. Check the centring and facing of the work pieces and check for alignment of the work pieces as per the final product output specifications PC5. Check the working of different holding fixtures, gears, stops etc. to control work piece movement, using hand tools, power tools, measuring instruments PC6. While performing Grinding/ Boring machining activities, mark spots on the work piece/ metal stock before performing the operation PC7. Move controls to adjust, start, or stop equipment during grinding process PC8. Clearly understanding the does and don'ts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors
B. Perform machining on the component	PC9. Start the lathe/ turning/milling/ shaping/ grinding/ boring/ broaching/ hobbing / facing/ shaping/ blanking/ piercing/ special purpose machine for operations PC10. Select the right cutting/ grinding/ broaching (teeth) tool as per tooling instructions and as per the work / supervisor 's instructions PC11. For manual grinding activities ensure the following: ○ Clear understanding of the metallurgical properties of the machined parts ○ two hand coordination is appropriate ○ checking the surface of the grinding plate to identify any abrasions, holes, plate inclination ○ Checking the rotation of the grinding wheel ○ understanding the usage of hardness testing machine

ASC/ N 3508: Perform different kinds of machining operations

	PC12. For milling operations check to ensure: ○ revolution ridges/marks are within the defined roughness limits associated with surface finish of the work piece ○ two hand coordination is appropriate as for manual operations ○ gap setting between milling rod and component is appropriate ○ correct angle is selected for cutting the parts ○ usage of measurement such as scales, venire calipers is made as per the work instructions PC13. Ensure that the right command is entered in the CNC machine as defined machining parameters PC14. In case of boring operations ensure that the length to bore diameter is fixed so that is does not cause deflection in the cutting tool PC15. Operate hand wheels or valves in order to feed the component and allow cooling and lubricating to the tool PC16. Turn on the coolantvalves and start their flow to maintain temperature in the machine chamber PC17. Brush or spray lubricating material on work pieces where applicable PC18. Move tool holders manually or by turning the hand wheels in order to feed tools along the machined component/ piece PC19. Take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc. PC20. Extract or lift jammed pieces from machines through use of wire hooks, lift bars, hands etc.
C. Observe/ Record the machining operations	PC21. Observe machine operations to detect defects in the component manufactured PC22. Observe the machine operations for any malfunctions and immediately inform the supervisor/ maintenance team of any malfunction observed to prevent damage to the machining equipment/ output product PC23. Ensure recording operational data such as pressure readings, length of strokes, feed rates, speed etc. in the formats specified by the supervisor PC24. Ensure tool replacement as per recommended tool life in no. of pieces PC25. Enter readings of key dimensions on control charts/ SPC record; provide required tool offsetting with the help of supervisor on correct side based on the reading
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. relevant standards and procedures followed in the company KA2. different types of products manufactured by the company KA3. different types of machining processes/ tool available KA4. process flow/ routing of various components in the machine shop/ organization
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. different types of machining processes

ASC/ N 3508: Perform different kinds of machining operations

	KB2. different types of tools used in the machining process and their identification KB3. basic fundamentals of machines and mechanics KB4. how to read machine drawing and machining the part to create the output as defined in the machine drawing KB5. knowledge of metal properties/ metallurgy KB6. knowledge of gear changing techniques and minor maintenance as per checklist KB7. basic principles of 5 S in manufacturing – Cleaning, sorting, scrap handling etc. KB8. the application of coolants and lubricants KB9. basic Arithmetic and calculation methods for tolerance limits
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. write basic level notes and observations SA2. draw basic level drawings and charts
	Reading skills
	The user/individual on the job needs to know and understand how to: SA3. read& comprehend documents and notes, process documentation & Control Plan SA4. interpret/ Comprehend the information given in the documents and notes SA5. read and interpret symbols given on equipment's and work area SA6. read machine drawings/ engineering drawings, sketches
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA7. discuss task lists and job requirements with co-workers SA8. effectively communicate information to team members SA9. question supervisor in order to understand the nature of the problem SA10. attentively listen with full attention and comprehend the information given by the speaker
B. Professional Skills	**Decision making**
	The user/individual on the job needs to know and understand how to: SB1. judge when to ask for help from a supervisor SB2. suggest options to operators in case any issue is observed during operations
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB3. plan work assigned on a daily basis and provide estimates of time required for each piece of work
	Customer centricity
	The user/individual on the job needs to know and understand how to: SB4. ensure that customer needs are assessed and every effort is made to provide satisfactory service
	Problem solving

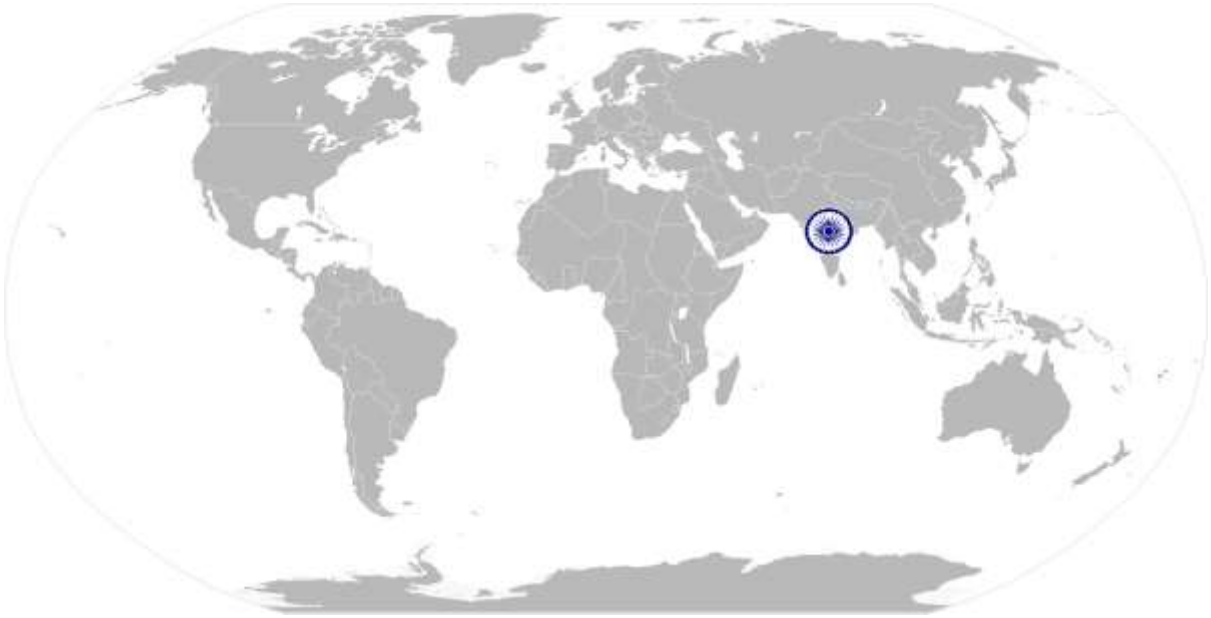
ASC/ N 3508: Perform different kinds of machining operations

	The user/individual on the job needs to know and understand how to: SB5. recognise a workplace problem or a potential problem and take action SB6. determine problems needing priority action SB7. refer problems outside area of responsibility to appropriate person SB8. gather information and provide assistance as required to solve problems
	Judgemental thinking
	The user/individual on the job needs to know and understand how to: SB9. use common sense and make judgments during day to day basis SB10. use reasoning skills to identify and resolve basic problems
	Desire to learn and take initiative
	The user/individual on the job needs to know and understand how to: SB11. follow instructions and work on areas of improvement identified SB12. complete the assigned tasks with some supervision SB13. complete the job defined by the supervisor within the timelines and quality norms
	Critical thinking
	The user/individual on the job needs to know and understand how to: SB14. analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently

NOS Version Control

NOS Code	**ASC/ N 3508**		
Credits(NSQF)	**TBD**	**Version number**	**1**
Industry	**Automotive**	**Drafted on**	**5/9/2013**
Industry Sub-sector	**Manufacturing**	**Last reviewed on**	**15/9/2013**
Occupation	**Machining**	**Next review date**	**15/9/2015**

National Occupational Standards



Overview

This unit is about completing al post machining activitiesand providing appropriate feedback for the next process

National Occupational Standard

ASC/ N 3509: Conducting all post machining activities

Unit Code	ASC/ N 3509
Unit Title (Task)	**Conducting all post machining operations**
Description	This NOS unit is about conducting all post machining operations such performing minor maintenance, assisting in tool change operations, de burring and gauging activities
Scope	The Machining Technician will be responsible for • conducting minor maintenance activities • performing de-burring and gauging of machined parts • supporting the maintenance team in tool changing process The job holder will cover different types of machining activities like hobbling, honing, broaching, milling, grinding, turning, shaping for creating auto components. The role holder will interact with the heat treatment, maintenance team and material management team
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
A. Perform minor machine maintenance activities	PC1. Maintain the machine as per proper operational condition/ daily maintenance check PC2. Perform minor machine maintenance activities such as oiling or cleaning machine and its components per the schedules given in the maintenance plan PC3. Clean the hydraulic tank/ Gauge/ Tools/ Fixtures as per the cleaning schedule and the process mentioned in the Work Instruction/ SOP manual PC4. Add coolant and lubricant in machine reservoir as per the SOPs PC5. Removing chips from different machine areas and dispose of scrap or waste material into the disposal area in accordance with the company policies and environmental regulations PC6. For broaching operations ensure that the broaching teeth is not broken and is flushed out of any metal chips PC7. Perform minor repairs and adjustments to the machine and notify supervisor/ maintenance team when major service/ repair is required
B. Perform de- burring activity on the machined components	PC8. With the help of the correct tool remove the extra burrs, sharp edges, rust and chips from the metal surface PC9. Use files, hand grinders, wire brushes, or power tools for performing de burring operations.Ensure usage of Personal Protective equipment like eye glasses and hand gloves. PC10. Trim, scrape, or deburr objects or parts, using chisels, scrapers, and other hand tools and equipment PC11. For automated processes perform shot blasting/ vibrio processes for completing de-burring operations
C. Check quality of machined component (Gauging)	PC12. Measure the specifications of the finished component and verify conformance as per Control Plan/ Work Instruction PC13. Use devices like micrometers, vernier calipers, gauges, rulers and any other inspection equipment for measuring specificationswith

ASC/ N 3509: Conducting all post machining activities

	valid calibration status. PC14. Note down the observations of thebasic inspection process and identify pieces which comply with the specified standards PC15. Separate the defective pieces into two categories – pieces which can be repaired/ modified and pieces which are beyond repair and maintain records of each category PC16. For all special parameters get the inspection done by QA/ Standard Room as per the frequency in the Control Plan and record the observations
D. Tool Changing Process	PC17. Organize changing different worn machine accessories, such as cutting/ grinding/ broaching/ hobbing tools(as per tool life listed, recommended) other hand tools PC18. Ensure that the blunt tool is timely and safely replaced by a new tool PC19. Replace machine part as per work instructions, using hand tools or notify supervisor/ engineering personnel for taking corrective actions PC20. For automated process observe the tool change cycle in order to ensure that the selected tool is transferred to the spindle from magazine after the previous tool is transferred to the magazine from the spindle PC21. Ensure that the zero offset value is chosen at the time of tool changing process
Knowledge and Understanding (K)w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. relevant standards and procedures followed in the company KA2. different types of products manufactured by the company
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. different types of machining processes KB2. different types of tools used in the machining process and de-burring process KB3. basic principles of 5 S in manufacturing – Cleaning, sorting KB4. post machining processes like deburring KB5. Impact of presence of burrs, edges, chips on the final product performance KB6. the application of coolant and lubricants KB7. basic Arithmetic and calculation methods
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. write basic level notes and observations SA2. draw basic level drawings and charts
	Reading skills

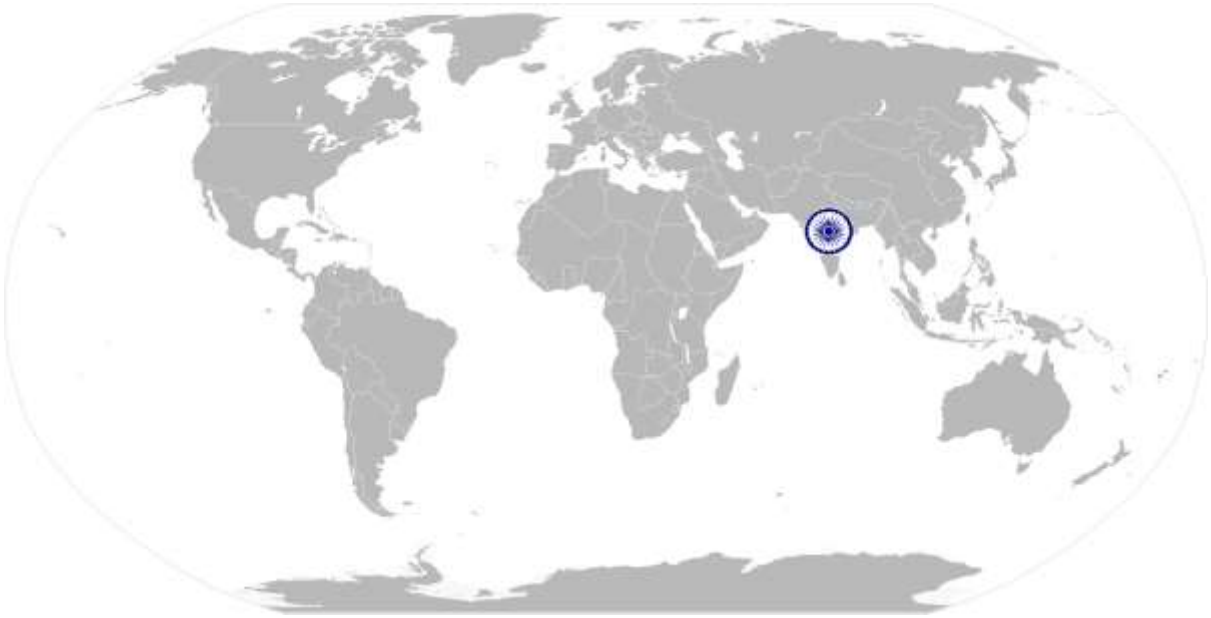
ASC/ N 3509: Conducting all post machining activities

	The user/individual on the job needs to know and understand how to: SA3. read documents and notes SA4. interpret/ Comprehend the information given in the documents and notes SA5. read and interpret symbols given on equipment's and work area
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. discuss task lists and job requirements with co-workers SA7. effectively communicate information to team members SA8. question operator/ supervisor in order to understand the nature of the problem SA9. attentively listen with full attention and comprehend the information given by the speaker
B. Professional Skills	**Decision making**
	The user/individual on the job needs to know and understand how to: SB1. analyse information and evaluate results to discuss the best solution with the operator to solve problemse.g. inspection results, rework status
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. plan work assigned on a daily basis and provide estimates of time required for each piece of work
	Problem solving
	The user/individual on the job needs to know and understand how to: SB3. recognise a workplace problem or a potential problem and take action by referring problems to the supervisor/ machine setter SB4. gather information and provide assistance as required to solve problems
	Judgemental thinking
	The user/individual on the job needs to know and understand how to: SB5. use common sense and make judgments during day to day basis SB6. use reasoning skills to identify and resolve basic problems SB7. escalate problem beyond individual's scope
	Desire to learn and take initiative
	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 some supervision SB10. complete the job defined by the supervisor within the timelines and quality norms

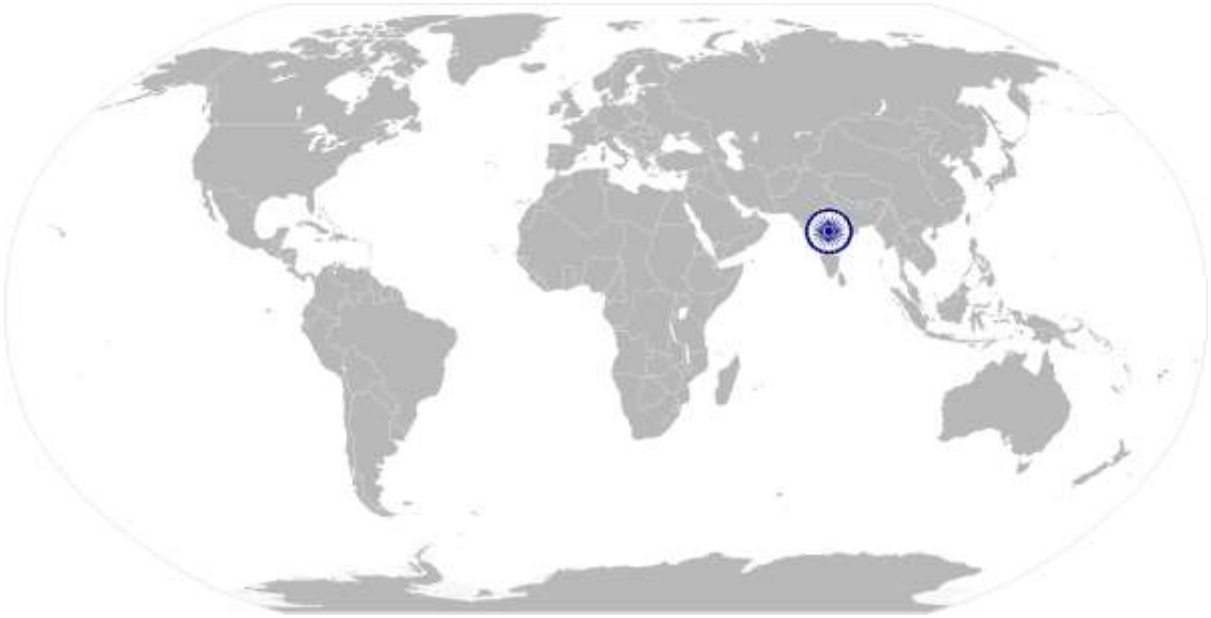
ASC/ N 3509: Conducting all post machining activities

NOS Version Control

NOS Code	**ASC/ N 3509**		
Credits(NSQF)	**TBD**	**Version number**	**1**
Industry	**Automotive**	**Drafted on**	**5/9/2013**
Industry Sub-sector	**Manufacturing**	**Last reviewed on**	**15/9/2013**
Occupation	**Machining**	**Next review date**	**15/9/2015**



National Occupational Standards



Overview

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

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

National Occupational Standard

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's PC9. Follow the Safety, Health and Environment related practices developed by the organization PC10. Ensure relevant safety board's/ 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.

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

	PC13. Attend all safety and fire drills to be self-aware of safety hazards and preventive techniques 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. informemployees 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

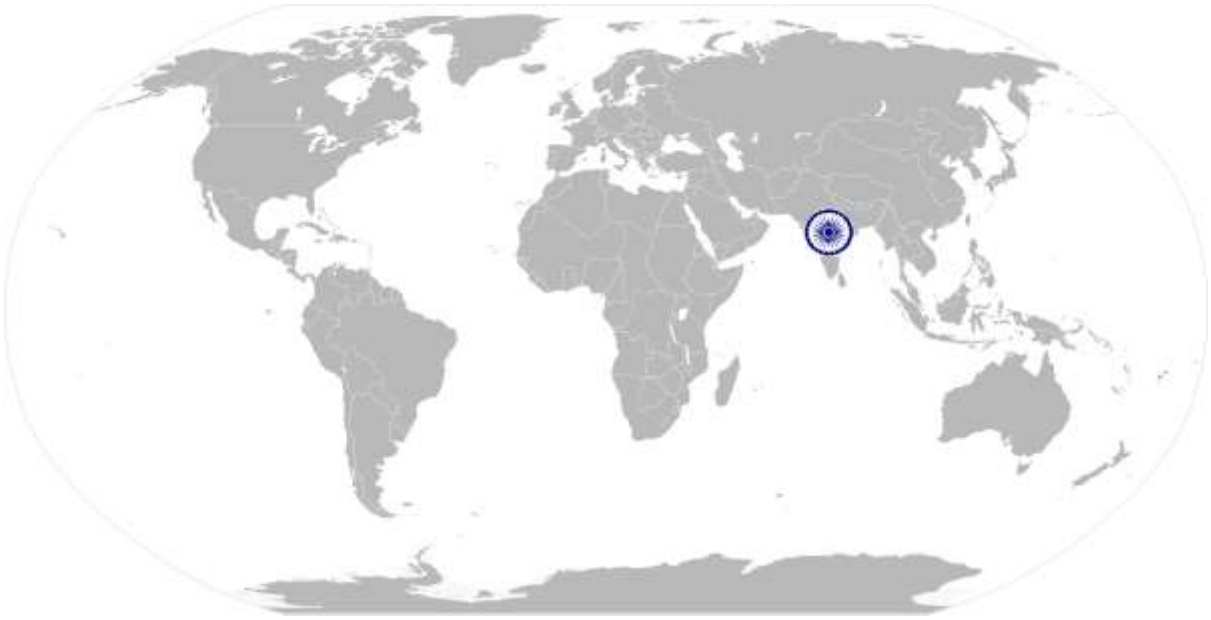
ASC/ N0006A: Maintain a healthy and safe working environment at the workplace

	programs
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**	**25/8/2015**

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	PC1. Follow the daily cleaning standards and schedules to create a clean working environment PC2. Attend all training programs for employees on 5 S PC3. Support the team during the audit of 5 S PC4. Participate actively in employee work groups on 5S and encourage team members for active participation PC5. 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

ASC/N0021: Maintaining 5S at the work premises

	body 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

ASC/N0021: Maintaining 5S at the work premises

	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
	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	CNC OPERATOR / Machining Technician L4
Qualification Pack	ASC/Q 3503
No. Of NOS	3 Role specific , 2 generic

NOS Title/ NOS Elements	NOS & Performance Criterion Description	Marks allocation	
ASC/N3507	Carrying Out the Pre- Machining Activities	Viva	Practical
Understanding the component requirements	PC1. Before starting the machining operations, obtain a detailed and thorough understanding of the task at hand: o understand the output product requirement by reading the engineering drawing specified in the work instructions/ work order o reading the control panel instructions/ job orders to determine the correct output product specifications o understanding the tooling instructions (fixtures, cutting tools, jigs etc.) as specified in the Operating Manual/ Work Instructions or Standard Operating Procedures o selection of proper coolant and lubricant required for machining the required component	25	25
Checking the dimensions for the component	PC2. Set the machine stops or guides or programmes as per the specified lengths indicated through scales or work instructions PC3. Measure and mark reference points/ cutting lines on the work pieces, using compasses, callipers, rulers and other measuring tools PC4. Understand acceptance requirements/ limits of machining e.g. surface finish, specific orientation, gauge inspection etc. PC5. Understand any other specific requirement for machining	20	30
Programming the machine for specific tool operations	PC6. Assist the Master Machining Technician in programming the CNC/ numerically controlled machine as per the work instructions PC7. Set the right material removal rate while programming the machine as per specified requirements E.g. for Hobbing set the ratio for the rotation of the shafts/spindle which determine the number of teeth made on the work piece PC8. Discuss technical matters related to machine programming with engineer/ supervisory/ personnel in the maintenance team	15	25
Performing wheel dressing activities for grinding	For manual wheel dressing activities for grinding operations perform the following activities:		

operations	PC9. always put machine guards in place before turning on grinding wheel PC10. run the wheels for a least one minute before actual work begins PC11. ensure proper balancing and dressing of wheels before use PC12. select and mount grinding wheels on machine, according to work instructions PC13. using hand tools and applying knowledge of abrasives and grinding procedures PC14. always use eye protection while performing these activities	20	30
	Sub total	**80**	**110**
ASC/N3508	**Perform all types of Machining Operations**	**Viva**	**Practical**
Setting up machine as per work instructions	PC1. Change the cutting tool of the Special Purpose Machine as per the process requirement PC2. Set-up, adjust machine tools, fixtures/ jigs and cutting tools in order to perform machining operations and keep dimension within the specified tolerance limit specified in the Standard Operating Procedures/ Operating manuals/ Control Panel PC3. Lift the work piece/ metal stock manually or through hoist and position the same securely in the machine using fasteners and hand tools and verify their positions with measuring instruments PC4. Check the centring and facing of the work pieces and check for alignment of the work pieces as per the final product output specifications PC5. Check the working of different holding fixtures, gears, stops etc. to control work piece movement, using hand tools, power tools, measuring instruments PC6. While performing Grinding/ Boring machining activities, mark spots on the work piece/ metal stock before performing the operation PC7. Move controls to adjust, start, or stop equipment during grinding process PC8. Clearly understanding the does and don'ts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors	0 0	10 20
Perform machining on the component	PC9. Start the lathe/ turning/milling/ shaping/ grinding/ boring/ broaching/ hobbing / facing/ shaping/ blanking/ piercing/ special purpose machine for operations PC10. Select the right cutting/ grinding/ broaching (teeth) tool as per tooling instructions and as per the work / supervisor 's instructions PC11. For manual grinding activities ensure the following:	10	20

	○ Clear understanding of the metallurgical properties of the machined parts ○ two hand coordination is appropriate ○ checking the surface of the grinding plate to identify any abrasions, holes, plate inclination ○ Checking the rotation of the grinding wheel ○ understanding the usage of hardness testing machine PC12. For milling operations check to ensure: ○ revolution ridges/marks are within the defined roughness limits associated with surface finish of the work piece ○ two hand coordination is appropriate as for manual operations ○ gap setting between milling rod and component is appropriate ○ correct angle is selected for cutting the parts ○ usage of measurement such as scales, vernier calipers is made as per the work instructions PC13. Ensure that the right command is entered in the CNC machine as defined machining parameters PC14. In case of boring operations ensure that the length to bore diameter is fixed so that is does not cause deflection in the cutting tool PC15. Operate hand wheels or valves in order to feed the component and allow cooling and lubricating to the tool PC16. Turn on the coolant valves and start their flow to maintain temperature in the machine chamber PC17. Brush or spray lubricating material on work pieces where applicable PC18. Move tool holders manually or by turning the hand wheels in order to feed tools along the machined component/ piece PC19. Take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc. PC20. Extract or lift jammed pieces from machines through use of wire hooks, lift bars, hands etc.	10 10 20	20 20 40
Observe/ Record the machining operations	PC21. Observe machine operations to detect defects in the component manufactured PC22. Observe the machine operations for any malfunctions and immediately inform the supervisor/ maintenance team of any malfunction observed to prevent damage to the machining equipment/ output product	5	10

	PC23. Ensure recording operational data such as pressure readings, length of strokes, feed rates, speed etc. in the formats specified by the supervisor PC24. Ensure tool replacement as per recommended tool life in no. of pieces PC25. Enter readings of key dimensions on control charts/ SPC record; provide required tool offsetting with the help of supervisor on correct side based on the reading	15	40
	subtotal	**70**	**180**
ASC/N 3509	**conducting all post machining operations**	**viva**	**Practical**
Perform minor machine maintenance activities	PC1. Maintain the machine as per proper operational condition/ daily maintenance check PC2. Perform minor machine maintenance activities such as oiling or cleaning machine and its components per the schedules given in the maintenance plan PC3. Clean the hydraulic tank/ Gauge/ Tools/ Fixtures as per the cleaning schedule and the process mentioned in the Work Instruction/ SOP manual PC4. Add coolant and lubricant in machine reservoir as per the SOPs PC5. Removing chips from different machine areas and dispose of scrap or waste material into the disposal area in accordance with the company policies and environmental regulations PC6. For broaching operations ensure that the broaching teeth is not broken and is flushed out of any metal chips PC7. Perform minor repairs and adjustments to the machine and notify supervisor/ maintenance team when major service/ repair is required	0 5	10 25
Perform de- burring activity on the machined components	PC8. With the help of the correct tool remove the extra burrs, sharp edges, rust and chips from the metal surface PC9. Use files, hand grinders, wire brushes, or power tools for performing de burring operations. Ensure usage of Personal Protective equipment like eye glasses and hand gloves. PC10. Trim, scrape, or deburr objects or parts, using chisels, scrapers, and other hand tools and equipment PC11. For automated processes perform shot blasting/ vibrio processes for completing de-burring operations	5	25
Check quality of machined component (Gauging)	PC12. Measure the specifications of the finished component and verify conformance as per Control Plan/ Work Instruction PC13. Use devices like micrometers, vernier calipers, gauges, rulers and any other inspection equipment for measuring specifications with valid calibration status. PC14. Note down the observations of the basic inspection		

	process and identify pieces which comply with the specified standards PC15. Separate the defective pieces into two categories – pieces which can be repaired/ modified and pieces which are beyond repair and maintain records of each category PC16. For all special parameters get the inspection done by QA/ Standard Room as per the frequency in the Control Plan and record the observations	5	20
Tool Changing Process	PC17. Organize changing different worn machine accessories, such as cutting/ grinding/ broaching/ hobbing tools(as per tool life listed, recommended) other hand tools PC18. Ensure that the blunt tool is timely and safely replaced by a new tool PC19. Replace machine part as per work instructions, using hand tools or notify supervisor/ engineering personnel for taking corrective actions PC20. For automated process observe the tool change cycle in order to ensure that the selected tool is transferred to the spindle from magazine after the previous tool is transferred to the magazine from the spindle PC21. Ensure that the zero offset value is chosen at the time of tool changing process	15	50
	Subtotal	**30**	**130**
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		
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		
	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 designated places and in the manner indicated in the 5S instructions	10	10
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	30
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**	**100**
	Total	**300**	**600**