

Qualification Pack



Machining Technician/CNC Operator Level 4

QP Code: ASC/Q3503

Version: 1.0

NSQF Level: 4

Automotive Skills Development Council || 153, Gr Floor, Okhla Industrial Area, Phase - III, Leela
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Qualification Pack

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ASC/Q3503: Machining Technician/CNC Operator Level 4

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.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [ASC/N0006: Maintain a safe and healthy working environment](#)
2. [ASC/N0021: Maintain 5S at the work premises](#)
3. [ASC/N3507: Carry out pre-machining activities](#)
4. [ASC/N3508: Perform different kinds of machining operations](#)
5. [ASC/N3509: Conduct all post machining operations](#)

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7223.5001
Minimum Educational Qualification & Experience	I.T.I (Mechanical/ Machine Technology) with 3-5 Years of experience Machining activities

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Minimum Level of Education for Training in School	
Pre-Requisite License or Training	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
Minimum Job Entry Age	18 Years
Last Reviewed On	30/10/2013
Next Review Date	31/03/2021
Deactivation Date	31/03/2021
NSQC Approval Date	20/07/2015
Version	1.0

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ASC/N0006: Maintain a safe and healthy working environment

Description

This NOS 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 and training team members on health and safety related issues

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

Elements and Performance Criteria

Identify and report the risks identified

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

- 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

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

- PC5..** Follow the instructions given on the equipment manual describing the operating process of the equipments
- PC6..** Follow the Safety, Health and Environment related practices developed by the organization
- PC7.** Operate the machine using the recommended Personal Protective Equipments (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 employees illness of contagious nature so that preventive actions can be planned for others

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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- KU1.** relevant standards, procedures and policies related to Health, Safety and Environment followed in the company
- KU2.** basic knowledge of Safety procedures(fire fighting, first aid) within the organization
- KU3.** knowledge of various types of PPEs and their usage
- KU4.** basic knowledge of risks/hazards associated with each occupation in the organization
- KU5.** how to safely operate various tools and machines and risks associated with the tools/ equipment
- KU6.** knowledge of personal hygiene and how an individual can contribute towards creating a highly safe and clean working environment

Generic Skills (GS)

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

- GS1.** write basic level notes and observations
- GS2.** read safety instructions put up across the plant premises
- GS3.** read safety precautions mentioned in equipment manuals and panels to understand the potential risks associated
- GS4.** effectively communicate information to team members
- GS5.** inform employees in the plant and concerned functions about events, incidents & potential risks observed related to Safety, Health and Environment.
- GS6.** question operator/ supervisor in order to understand the safety related issues
- GS7.** attentively listen with full attention and comprehend the information given by the speaker during safety drills and training programs
- GS8.** use common sense and make judgments during day to day basis
- GS9.** use reasoning skills to identify and resolve basic problems
- GS10.** use common sense and make judgments during day to day basis
- GS11.** use reasoning skills to identify and resolve basic problems

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Identify and report the risks identified</i>	8	23	-	-
PC1.. Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals ,loud noise	3	6	-	-
PC2. Inform the concerned authorities about the potential risks identified in the processes, workplace area/ layout, materials used etc	2	6	-	-
PC3. Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations	2	6	-	-
PC4. Create awareness amongst other by sharing information on the identified risks	1	5	-	-
<i>Create and sustain a Safe, clean and environment friendly work place</i>	17	52	-	-
PC5.. Follow the instructions given on the equipment manual describing the operating process of the equipments	3	7	-	-
PC6.. Follow the Safety, Health and Environment related practices developed by the organization	3	8	-	-
PC7. Operate the machine using the recommended Personal Protective Equipments (PPE)	3	8	-	-
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	2	8	-	-
PC9. Maintain high standards of personal hygiene at the work place	2	7	-	-
PC10. Ensure that the waste disposal is done in the designated area and manner as per organization SOP.	3	8	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Inform appropriately the medical officer/ HR in case of self or an employees illness of contagious nature so that preventive actions can be planned for others	1	6	-	-
NOS Total	25	75	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N0006
NOS Name	Maintain a safe and healthy working environment
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Maintenance
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	15/09/2013
Next Review Date	15/09/2015
NSQC Clearance Date	20/07/2015

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ASC/N0021: Maintain 5S at 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

Elements and Performance Criteria

Ensure sorting

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

- PC1..** follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and unnecessary 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
- PC10.** follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists

Ensure proper documentation and storage (organizing , streamlining)

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

- 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

Ensure cleaning of self and the work place

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

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- 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

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

- 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 (KU)

The individual on the job needs to know and understand:

- KU1.** relevant standards, procedures and policies related to 5S followed in the company
- KU2.** have basic knowledge of 5S procedures
- KU3.** know various types 5s practices followed in various areas
- KU4.** understand the 5S checklists provided in the department/ team
- KU5.** have skills to identify useful & non useful items
- KU6.** have knowledge of labels , signs & colours used as indicators
- KU7.** knowledge on how to sort and store various types of tools, equipment, material etc.
- KU8.** know , how to identify various types of waste products
- KU9.** understand the impact of waste/ dirt/ dust/unwanted substances on the process/ environment/ machinery/ human body
- KU10.** have knowledge of best ways of cleaning & waste disposal
- KU11.** understand the importance of standardization in processes
- KU12.** understand the importance of sustainability in 5S
- KU13.** have knowledge of TQM process
- KU14.** have knowledge of various materials and storage norms
- KU15.** understand visual controls, symbols, graphs etc.

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Generic Skills (GS)

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

- GS1.** write basic level notes and observations
- GS2.** note down observations (if any) related to the process
- GS3.** read 5S instructions put up across the plant premises
- GS4.** effectively communicate information to team members inform employees in the plant and concerned functions about 5S
- GS5.** question the process head in order to understand the 5S related issues
- GS6.** attentively listen with full attention and comprehend the information given by the speaker during 5S training programs
- GS7.** use common sense and make judgments during day to day basis
- GS8.** use reasoning skills to identify and resolve basic problems using 5S
- GS9.** persuade co team members to follow 5 S
- GS10.** ensure that the co team members understand the importance of using 5 S tool
- GS11.** use innovative skills to perform and manage 5 S activities at the work desk and the shop floor
- GS12.** exhibit inquisitive behaviour to seek feedback and question on the existing set patterns of work
- GS13.** do what is right, not what is a popular practices
- GS14.** follow shop floor rules& regulations and avoid deviations; make 5S an integral way of life
- GS15.** ensure self-cleanliness on a daily basis
- GS16.** demonstrate the will to keep the work area in a clean and orderly manner

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Ensure sorting</i>	10	30	-	-
PC1.. follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and unnecessary items are not cluttering the workbenches or work surfaces.	1	3	-	-
PC2.. ensure segregation of waste in hazardous/ non hazardous waste as per the sorting work instructions	1	3	-	-
PC3.. follow the technique of waste disposal and waste storage in the proper bins as per sop	1	3	-	-
PC4.. segregate the items which are labelled as red tag items for the process area and keep them in the correct places	1	3	-	-
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	1	3	-	-
PC6. . ensure that areas of material storage areas are not overflowing	1	3	-	-
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	1	3	-	-
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	1	3	-	-
PC9. follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards	1	3	-	-
PC10. follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists	1	3	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Ensure proper documentation and storage (organizing , streamlining)</i>	3	9	-	-
PC11. check that the items in the respective areas have been identified as broken or damaged	1	3	-	-
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	1	3	-	-
PC13. make sure that all material and tools are stored in the designated places and in the manner indicated in the 5s instructions	1	3	-	-
<i>Ensure cleaning of self and the work place</i>	8	24	-	-
PC14. check whether safety glasses are clean and in good condition	1	3	-	-
PC15. keep all outside surfaces of recycling containers are clean	1	3	-	-
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	1	3	-	-
PC17.. check whether all hoses, cabling & wires are clean, in good condition and clamped to avoid any mishap or mix up	1	3	-	-
PC18.. ensure workbenches and work surfaces are clean and in good condition	1	3	-	-
PC19. follow the cleaning schedule for the lighting system to ensure proper illumination	1	3	-	-
PC20. store the cleaning material and equipment in the correct location and in good condition	1	3	-	-
PC21. ensure self-cleanliness - clean uniform, clean shoes, clean gloves, clean helmets, personal hygiene	1	3	-	-
<i>Ensure sustenance</i>	4	12	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. follow the daily cleaning standards and schedules to create a clean working environment	1	3	-	-
PC23. attend all training programs for employees on 5 s	0.5	2	-	-
PC24. support the team during the audit of 5 s	1	3	-	-
PC25. participate actively in employee work groups on 5s and encourage team members for active participation	0.5	2	-	-
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	1	2	-	-
NOS Total	25	75	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N0021
NOS Name	Maintain 5S at the work premises
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	15/03/2014
Next Review Date	15/03/2016
NSQC Clearance Date	

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ASC/N3507: Carry 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

Elements and Performance Criteria

Understanding the component requirements

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

- 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

Checking the dimensions for the component

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

- 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

Programming the machine for specific tool operations

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

- 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

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- PC8.** . discuss technical matters related to machine programming with engineer/ supervisory/ personnel in the maintenance team

Performing wheel dressing activities for grinding operations

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

- 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

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** relevant standards and procedures followed in the company
- KU2.** different types of products manufactured by the company
- KU3.** different types of machining processes/ tools available
- KU4.** different types of machining processes
- KU5.** basic fundamentals of machines and mechanics
- KU6.** different types of tools used in the machining process with respect to type of process to be conducted
- KU7.** basic principles of 5 S in manufacturing Cleaning, sorting, scrap handling etc.
- KU8.** the application of coolant and lubricants
- KU9.** impact of various machining processes on the final product outcome
- KU10.** basic Arithmetic and calculation methods for tolerance limits
- KU11.** safety guidelines related to different machines

Generic Skills (GS)

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

- GS1.** write basic level notes and observations
- GS2.** draw basic level geometrical/ mechanical drawings and charts
- GS3.** read and interpret workplace related documentation
- GS4.** read and interpret engineering drawings and sketches to understand the dimension of the output product
- GS5.** discuss task lists and job requirements with co-workers
- GS6.** effectively communicate information to team members
- GS7.** discuss with supervisor in order to understand the nature of the problem
- GS8.** attentively listen with full attention and comprehend the information given by the speaker
- GS9.** judge when to ask for help from a supervisor

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- GS10.** suggest options to operators in case any issue is observed during operations
- GS11.** plan work assigned on a daily basis and provide estimates of time required for each piece of work
- GS12.** prioritize actions to achieve required outcomes
- GS13.** analyse the complexity of work to determine if it can be successfully carried out
- GS14.** ability to visualize the final product from the engineering drawing/ machine drawing, sketch provided by the supervisor
- GS15.** analyse the cause of defects related to e.g. cutting tools, machine, fixtures etc
- GS16.** learn from mistakes by analysing and discussing with peers/ seniors
- GS17.** discuss new ideas and participate in new initiatives
- GS18.** follow instructions and work on areas of improvement identified
- GS19.** complete the assigned tasks with minimum supervision
- GS20.** complete the job defined by the supervisor within the timelines and quality norms

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Understanding the component requirements</i>	2	5	-	-
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	2	5	-	-
<i>Checking the dimensions for the component</i>	8	23	-	-
PC2. . set the machine stops or guides or programmes as per the specified lengths indicated through scales or work instructions	2	8	-	-
PC3. . measure and mark reference points/ cutting lines on the work pieces, using compasses, callipers, rulers and other measuring tools	2	7	-	-
PC4. . understand acceptance requirements/ limits of machining e.g. surface finish, specific orientation, gauge inspection etc.	2	4	-	-
PC5. . understand any other specific requirement for machining	2	4	-	-
<i>Programming the machine for specific tool operations</i>	5	15	-	-
PC6. . assist the master machining technician in programming the cnc/ numerically controlled machine as per the work instructions	2	6	-	-
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	2	6	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC8. . discuss technical matters related to machine programming with engineer/ supervisory/ personnel in the maintenance team	1	3	-	-
<i>Performing wheel dressing activities for grinding operations</i>	10	32	-	-
PC9. . always put machine guards in place before turning on grinding wheel	1	5	-	-
PC10.. run the wheels for a least one minute before actual work begins	1	4	-	-
PC11. . ensure proper balancing and dressing of wheels before use	2	6	-	-
PC12. . select and mount grinding wheels on machine, according to work instructions	3	6	-	-
PC13. . using hand tools and applying knowledge of abrasives and grinding procedures	2	6	-	-
PC14. . always use eye protection while performing these activities	1	5	-	-
NOS Total	25	75	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3507
NOS Name	Carry out pre-machining activities
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	15/09/2013
Next Review Date	31/12/2015
NSQC Clearance Date	20/07/2015

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ASC/N3508: 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

Elements and Performance Criteria

Setting up machine as per work instructions

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

- 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 donts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors

Perform machining on the component

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

- 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

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- PC11.** . for manual grinding activities ensure the following:
 - o Clear understanding of the metallurgical properties of the machined parts
 - o two hand coordination is appropriate
 - o checking the surface of the grinding plate to identify any abrasions, holes, plate inclination
 - o Checking the rotation of the grinding wheel
 - o understanding the usage of hardness testing machine
- PC12.**.. for milling operations check to ensure:
 - o revolution ridges/marks are within the defined roughness limits associated with surface finish of the work piece
 - o two hand coordination is appropriate as for manual operations
 - o gap setting between milling rod and component is appropriate
 - o correct angle is selected for cutting the parts
 - o 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 it 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.

Observe/ Record the machining operations

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

- 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 (KU)

The individual on the job needs to know and understand:

- KU1.** relevant standards and procedures followed in the company
- KU2.** different types of products manufactured by the company
- KU3.** different types of machining processes/ tool available
- KU4.** process flow/ routing of various components in the machine shop/ organization
- KU5.** different types of machining processes

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- KU6.** different types of tools used in the machining process and their identification
- KU7.** basic fundamentals of machines and mechanics
- KU8.** how to read machine drawing and machining the part to create the output as defined in the machine drawing
- KU9.** knowledge of metal properties/ metallurgy
- KU10.** knowledge of gear changing techniques and minor maintenance as per checklist
- KU11.** basic principles of 5 S in manufacturing Cleaning, sorting, scrap handling etc.
- KU12.** the application of coolants and lubricants
- KU13.** basic Arithmetic and calculation methods for tolerance limits

Generic Skills (GS)

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

- GS1.** write basic level notes and observations
- GS2.** draw basic level drawings and charts
- GS3.** read & comprehend documents and notes, process documentation & Control Plan
- GS4.** interpret/ Comprehend the information given in the documents and notes
- GS5.** read and interpret symbols given on equipments and work area
- GS6.** read machine drawings/ engineering drawings, sketches
- GS7.** discuss task lists and job requirements with co-workers
- GS8.** effectively communicate information to team members
- GS9.** question supervisor in order to understand the nature of the problem
- GS10.** attentively listen with full attention and comprehend the information given by the speaker
- GS11.** judge when to ask for help from a supervisor
- GS12.** suggest options to operators in case any issue is observed during operations
- GS13.** plan work assigned on a daily basis and provide estimates of time required for each piece of work
- GS14.** ensure that customer needs are assessed and every effort is made to provide satisfactory service
- GS15.** recognise a workplace problem or a potential problem and take action
- GS16.** determine problems needing priority action
- GS17.** refer problems outside area of responsibility to appropriate person
- GS18.** gather information and provide assistance as required to solve problems
- GS19.** use common sense and make judgments during day to day basis
- GS20.** use reasoning skills to identify and resolve basic problems
- GS21.** follow instructions and work on areas of improvement identified
- GS22.** complete the assigned tasks with some supervision
- GS23.** complete the job defined by the supervisor within the timelines and quality norms
- GS24.** analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Setting up machine as per work instructions</i>	10.5	26	-	-
PC1. . change the cutting tool of the Special Purpose Machine as per the process requirement	2	4	-	-
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	2	4	-	-
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	1	3	-	-
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	1	3	-	-
PC5. . check the working of different holding fixtures, gears, stops etc. to control work piece movement, using hand tools, power tools, measuring instruments	1	3	-	-
PC6. . while performing Grinding/ Boring machining activities, mark spots on the work piece/ metal stock before performing the operation	1	3	-	-
PC7. . move controls to adjust, start, or stop equipment during grinding process	1	3	-	-
PC8. .. clearly understanding the does and donts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors	1.5	3	-	-
<i>Perform machining on the component</i>	16	32	-	-
PC9. . start the lathe/ turning/milling/ shaping/ grinding/ boring/ broaching/ hobbing / facing/ shaping/ blanking/ piercing/ special purpose machine for operations	2	4	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. select the right cutting/ grinding/ broaching (teeth) tool as per tooling instructions and as per the work / supervisor s instructions	2	4	-	-
PC11. . for manual grinding activities ensure the following: o Clear understanding of the metallurgical properties of the machined parts o two hand coordination is appropriate o checking the surface of the grinding plate to identify any abrasions, holes, plate inclination o Checking the rotation of the grinding wheel o understanding the usage of hardness testing machine	2	3	-	-
PC12. .. for milling operations check to ensure: o revolution ridges/marks are within the defined roughness limits associated with surface finish of the work piece o two hand coordination is appropriate as for manual operations o gap setting between milling rod and component is appropriate o correct angle is selected for cutting the parts o usage of measurement such as scales, venire calipers is made as per the work instructions	2	3	-	-
PC13. . ensure that the right command is entered in the CNC machine as defined machining parameters	2	3	-	-
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	1	2	-	-
PC15. . operate hand wheels or valves in order to feed the component and allow cooling and lubricating to the tool	1	2	-	-
PC16. . turn on the coolantvalves and start their flow to maintain temperature in the machine chamber	1	2	-	-
PC17. . brush or spray lubricating material on work pieces where applicable	1	2	-	-
PC18. . move tool holders manually or by turning the hand wheels in order to feed tools along the machined component/ piece	0.5	2	-	-
PC19. . take appropriate action in case of any irregularities e.g. power failure, rejection, tool breakage etc.	1	2	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. . extract or lift jammed pieces from machines through use of wire hooks, lift bars, hands etc.	0.5	3	-	-
<i>Observe/ Record the machining operations</i>	3.5	12	-	-
PC21. . observe machine operations to detect defects in the component manufactured	0.5	3	-	-
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	0.5	3	-	-
PC23. . ensure recording operational data such as pressure readings, length of strokes, feed rates, speed etc. in the formats specified by the supervisor	0.5	2	-	-
PC24. . ensure tool replacement as per recommended tool life in no. of pieces	1	2	-	-
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	1	2	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3508
NOS Name	Perform different kinds of machining operations
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining
NSQF Level	4
Credits	TBD
Version	1.0
Last Reviewed Date	15/09/2013
Next Review Date	31/12/2015
NSQC Clearance Date	20/07/2015

Qualification Pack

ASC/N3509: Conduct 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

Elements and Performance Criteria

Perform minor machine maintenance activities

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

- 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

Perform de burring activity on the machined components

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

- 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/ vibro processes for completing de-burring operations

Check quality of machined component (Gauging)

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

- 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
- 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

Tool Changing Process

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

- 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 (KU)

The individual on the job needs to know and understand:

- KU1.** relevant standards and procedures followed in the company
- KU2.** different types of products manufactured by the company
- KU3.** different types of machining processes
- KU4.** different types of tools used in the machining process and de-burring process
- KU5.** basic principles of 5 S in manufacturing Cleaning, sorting
- KU6.** post machining processes like deburring
- KU7.** Impact of presence of burrs, edges, chips on the final product performance KB6. the application of coolant and lubricants
- KU8.** basic Arithmetic and calculation methods

Generic Skills (GS)

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

- GS1.** write basic level notes and observations

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- GS2.** draw basic level drawings and charts
- GS3.** read documents and notes
- GS4.** interpret/ Comprehend the information given in the documents and notes
- GS5.** read and interpret symbols given on equipments and work area
- GS6.** discuss task lists and job requirements with co-workers
- GS7.** effectively communicate information to team members
- GS8.** question operator/ supervisor in order to understand the nature of the problem
- GS9.** attentively listen with full attention and comprehend the information given by the speaker
- GS10.** analyse information and evaluate results to discuss the best solution with the operator to solve problemse.g. inspection results, rework status
- GS11.** plan work assigned on a daily basis and provide estimates of time required for each piece of work
- GS12.** recognise a workplace problem or a potential problem and take action by referring problems to the supervisor/ machine setter
- GS13.** gather information and provide assistance as required to solve problems
- GS14.** use common sense and make judgments during day to day basis
- GS15.** use reasoning skills to identify and resolve basic problems
- GS16.** escalate problem beyond individuals scope
- GS17.** follow instructions and work on areas of improvement identified
- GS18.** complete the assigned tasks with some supervision
- GS19.** complete the job defined by the supervisor within the timelines and quality norms

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform minor machine maintenance activities</i>	7	28	-	-
PC1.. maintain the machine as per proper operational condition/ daily maintenance check	1	4	-	-
PC2. . perform minor machine maintenance activities such as oiling or cleaning machine and its components per the schedules given in the maintenance plan	1	4	-	-
PC3.. clean the hydraulic tank/ gauge/ tools/ fixtures as per the cleaning schedule and the process mentioned in the work instruction/ sop manual	1	4	-	-
PC4. . add coolant and lubricant in machine reservoir as per the sops	1	4	-	-
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	1	4	-	-
PC6. . for broaching operations ensure that the broaching teeth is not broken and is flushed out of any metal chips	1	4	-	-
PC7. . perform minor repairs and adjustments to the machine and notify supervisor/ maintenance team when major service/ repair is required	1	4	-	-
<i>Perform de burring activity on the machined components</i>	4	16	-	-
PC8. . with the help of the correct tool remove the extra burrs, sharp edges, rust and chips from the metal surface	1	4	-	-
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	1	4	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. trim, scrape, or deburr objects or parts, using chisels, scrapers, and other hand tools and equipment	1	4	-	-
PC11. . for automated processes perform shot blasting/ vibro processes for completing de-burring operations	1	4	-	-
<i>Check quality of machined component (Gauging)</i>	5	20	-	-
PC12. .. measure the specifications of the finished component and verify conformance as per control plan/ work instruction	1	4	-	-
PC13. . use devices like micrometers, vernier calipers, gauges, rulers and any other inspection equipment for measuring specifications with valid calibration status.	1	4	-	-
PC14. .. note down the observations of the basic inspection process and identify pieces which comply with the specified standards	1	4	-	-
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	1	4	-	-
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	1	4	-	-
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	1	4	-	-
<i>Tool Changing Process</i>	4	16	-	-
PC17. . organize changing different worn machine accessories, such as cutting/ grinding/ broaching/ hobbing tools(as per tool life listed, recommended) other hand tools	1	3	-	-
PC18. .. ensure that the blunt tool is timely and safely replaced by a new tool	1	3	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC19. .. replace machine part as per work instructions, using hand tools or notify supervisor/ engineering personnel for taking corrective actions	1	4	-	-
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	0.5	3	-	-
PC21. . ensure that the zero offset value is chosen at the time of tool changing process	0.5	3	-	-
NOS Total	20	80	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N3509
NOS Name	Conduct all post machining operations
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Machining
NSQF Level	4
Credits	NA
Version	1.0
Last Reviewed Date	15/09/2013
Next Review Date	31/12/2015
NSQC Clearance Date	20/07/2015

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Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Element/ Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each Element/ PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
6. To pass the Qualification Pack assessment, every trainee should score the Recommended Pass % aggregate for the QP.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Recommended Pass % : 70

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N0006.Maintain a safe and healthy working environment	25	75	-	-	100	10
ASC/N0021.Maintain 5S at the work premises	25	75	-	-	100	15
ASC/N3507.Carry out pre-machining activities	25	75	-	-	100	20
ASC/N3508.Perform different kinds of machining operations	30	70	-	-	100	30

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National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N3509. Conduct all post machining operations	20	80	-	-	100	25
Total	125	375	-	-	500	100

Qualification Pack

Acronyms

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

Qualification Pack

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

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Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.