

Qualification Pack



Prototyping Engineer

QP Code: ASC/Q8301

Version: 1.0

NSQF Level: 6

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ASC/Q8301: Prototyping Engineer

Brief Job Description

The role entails ensuring that assembly line fitters are assembling the prototype electrical and mechanical components as per the New Product requirement and the machine shop/ casting shop/ forging shop are preparing various aggregates through different machining operations.

Personal Attributes

The individual should be willing to work at shop floor for long hours. The individual should possess coordination and interpersonal skills. The individual should also be able to demonstrate skills for information ordering, imagination, analytical reasoning, technology, customer orientation, oral expression and comprehension.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [ASC/N0006: Maintain a safe and healthy working environment](#)
2. [ASC/N0022: Ensure implementation of 5S activities at the shop floor & the office area](#)
3. [ASC/N8301: Understand the process and equipment requirement to complete the task](#)
4. [ASC/N8302: Preparing the machine, auxiliary apparatus and metal work pieces](#)
5. [ASC/N8303: Performing the actual prototyping operations](#)

Qualification Pack (QP) Parameters

Sector	Automotive
Sub-Sector	Research & Development
Occupation	Prototyping
Country	India
NSQF Level	6
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2144.0701
Minimum Educational Qualification & Experience	B.E./B.Tech (Mechanical/Automobile engineering) with 2-3 years of experience Research and Development(for B.E)

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Minimum Level of Education for Training in School	
Pre-Requisite License or Training	Basic prototyping techniques Automotive sector regulations Usage of different types of assembly tools 5S and Safety Problem solving Quality Management Team management skills
Minimum Job Entry Age	18 Years
Last Reviewed On	30/12/2013
Next Review Date	30/06/2020
Deactivation Date	30/06/2020
NSQC Approval Date	05/08/2015
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:

- KU1.** relevant standards, procedures and policies related to Health, Safety and Environment followed in the company

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- 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

Qualification Pack

ASC/N0022: Ensure implementation of 5S activities at the shop floor & the office area

Description

This NOS is about overseeing the implementation of all 5 S activities both at the shop floor and the office area by the team members and training the team in implementation of the 5S principles

Scope

The individual needs to Ensure sorting, streamlining/ organizing, storage and documentation, systematic cleaning, standardization and sustenance across the plant and office premises of the organization as given in the organization guidelines

Elements and Performance Criteria

Ensure proper sorting of items at the work place

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

- PC1..** ensure all recyclable materials are put in designated containers
- PC2.** ensure no tools, fixtures & jigs are lying on workstations unless in use and no un-necessary items is lying on workbenches or work surfaces unless in use
- PC3.** ensure that the operators and other team members are segregating the waste in hazardous/ non hazardous waste as per the sorting work instructions
- PC4.** ensure that all the operators are following the technique of waste disposal and waste storage in the designated bins
- PC5..** segregate the items which are labelled at red tag items for the process area and keep them in the correct places
- PC6..** ensure that all the tools/ equipment/ fasteners/ spare parts are arranged as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5s guidelines/ work instructions
- PC7.** check for return of any type of extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area
- PC8. .** oversee removal of unnecessary equipment, storage, furniture, unneeded inventory, supplies, parts and material
- PC9.** ensure that areas of material storage areas are not overflowing
- PC10.** ensure proper stacking and storage of 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

Ensure proper documentation and storage - streamlining & organizing the workplace

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

- PC11.** ensure that the team follows the given instructions and checks for labelling of fluids, oils lubricants, solvents, chemicals etc and proper storage of the same to avoid spillage, leakage, fire etc
- PC12.** make sure that all material and tools are stored in the designated places and in the manner indicated in the 5s instructions

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- PC13.** ensure that organizing the workplace takes place with due considerations to the principles of wasted motions, ergonomics, work & method study .

Ensure cleaning of self and the work place

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

- PC14.** ensure that the area has floors swept, machinery clean and is generally neat and tidy in case of cleaning, ensure that correct displays are maintained on the floor which indicate potential safety hazards
- PC15..** ensure workbenches and work surfaces are clean and in good condition
- PC16..** ensure adherence to the cleaning schedule for the lighting system to ensure proper illumination
- PC17..** ensure all recyclable materials are put in designated containers

Ensure standardization

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

- PC18.** ensure that daily cleaning standards and schedules to create a clean working environment are followed across the plant
- PC19..** ensure all recyclable materials are put in designated containers
- PC20. .** ensure logical and user friendly documentation and file management for all activities across the plant and create guidelines around standardization of processes
- PC21.** ensure timely creation and sharing of the 5s checklists
- PC22.** ensure that the 5s manual are available as per the timelines

Ensure sustenance

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

- PC23.** ensure team cooperation during the audit of 5 s activities
- PC24.** ensure that workmen are periodically trained to address challenges related to 5s
- PC25..** participate actively in employee work groups on 5s and encourage team members for active participation
- PC26..** oversee that the staff/operators are trained and fully understand 5s procedures
- PC27. .** ensure that all the guidelines for what to do and what not to do to build sustainability in 5s are mentioned in the 5s check lists/ work instructions and are easily searchable
- PC28.** ensure continuous training of the team members on 5s in order to increase their awareness and support implementation
- PC29.** ensure that all visual controls, notice boards, symbols etc at the manufacturing place are created, working and are put up as per the requirement

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

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- KU6.** have knowledge of labels , signs & colours used as indicators
- KU7.** Have 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/unwantedsubstances on the process/ environment/ machinery/ humanbody
- KU10.** have knowledge of best and environment protective ways ofcleaning & 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

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.** write information documents to internal departments/ internal teams
- GS4.** read 5S instructions put up across the plant premises
- GS5.** effectively communicate information to team members inform employees in the plant and concerned functions about 5S
- GS6.** question the process head in order to understand the 5S related issues
- GS7.** attentively listen with full attention and comprehend the information given by the speaker during 5S training programs
- GS8.** use common sense and make judgments during day to day basis
- GS9.** use reasoning skills to identify and resolve basic problems using 5S
- GS10.** persuade team members to follow 5 S
- GS11.** ensure that the team members understand the importance of using 5 S tool
- GS12.** use innovative skills to perform and manage 5 S activities at the work desk and the shop floor
- GS13.** exhibit inquisitive behaviour to seek feedback and question on the existing set patterns of work emerge, techniques in CA/CI around 5 S work practices
- GS14.** do what is right, not what is a popular practice
- GS15.** follow shop floor rules& regulations and avoid deviations
- GS16.** lead by example in the plant premises while performing activities related to 5S
- GS17.** ensure self-cleanliness on a daily basis
- GS18.** demonstrate the will to keep the work area in a clean and orderly manner
- GS19.** accept additional responsibility for self and the team
- GS20.** encourage self and other to take greater responsibilities for managing 5S
- GS21.** identify obstacles and bottlenecks in the process and find basic level solutions for removing these obstacles

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- GS22.** use previous experience in resolving problems and taking decisions
- GS23.** make timely and independent decisions on the line/ shift within the boundaries of the delegation matrix of the organization

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Ensure proper sorting of items at the work place</i>	10	25	-	-
PC1.. ensure all recyclable materials are put in designated containers	1	2.5	-	-
PC2. ensure no tools, fixtures & jigs are lying on workstations unless in use and no un-necessary items is lying on workbenches or work surfaces unless in use	1	2.5	-	-
PC3. ensure that the operators and other team members are segregating the waste in hazardous/ non hazardous waste as per the sorting work instructions	1	2.5	-	-
PC4. ensure that all the operators are following the technique of waste disposal and waste storage in the designated bins	1	2.5	-	-
PC5.. segregate the items which are labelled at red tag items for the process area and keep them in the correct places	1	2.5	-	-
PC6.. ensure that all the tools/ equipment/ fasteners/ spare parts are arranged as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5s guidelines/ work instructions	1	2.5	-	-
PC7. check for return of any type of extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area	1	2.5	-	-
PC8. . oversee removal of unnecessary equipment, storage, furniture, unneeded inventory, supplies, parts and material	1	2.5	-	-
PC9. ensure that areas of material storage areas are not overflowing	1	2.5	-	-
PC10. ensure proper stacking and storage of 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	2.5	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Ensure proper documentation and storage - streamlining & organizing the workplace</i>	3	7.5	-	-
PC11. ensure that the team follows the given instructions and checks for labelling of fluids, oils lubricants, solvents, chemicals etc and proper storage of the same to avoid spillage, leakage, fire etc	1	2.5	-	-
PC12. make sure that all material and tools are stored in the designated places and in the manner indicated in the 5s instructions	1	2.5	-	-
PC13. ensure that organizing the workplace takes place with due considerations to the principles of wasted motions, ergonomics, work & method study .	1	2.5	-	-
<i>Ensure cleaning of self and the work place</i>	4	10	-	-
PC14. ensure that the area has floors swept, machinery clean and is generally neat and tidy in case of cleaning, ensure that correct displays are maintained on the floor which indicate potential safety hazards	1	2.5	-	-
PC15.. ensure workbenches and work surfaces are clean and in good condition	1	2.5	-	-
PC16.. ensure adherence to the cleaning schedule for the lighting system to ensure proper illumination	1	2.5	-	-
PC17.. ensure all recyclable materials are put in designated containers	1	2.5	-	-
<i>Ensure standardization</i>	5	12.5	-	-
PC18. ensure that daily cleaning standards and schedules to create a clean working environment are followed across the plant	1	2.5	-	-
PC19.. ensure all recyclable materials are put in designated containers	1	2.5	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC20. . ensure logical and user friendly documentation and file management for all activities across the plant and create guidelines around standardization of processes	1	2.5	-	-
PC21. ensure timely creation and sharing of the 5s checklists	1	2.5	-	-
PC22. ensure that the 5s manual are available as per the timelines	1	2.5	-	-
<i>Ensure sustenance</i>	7	16	-	-
PC23. ensure team cooperation during the audit of 5 s activities	1	2.5	-	-
PC24. ensure that workmen are periodically trained to address challenges related to 5s	1	2.5	-	-
PC25.. participate actively in employee work groups on 5s and encourage team members for active participation	1	2	-	-
PC26.. oversee that the staff/operators are trained and fully understand 5s procedures	1	2	-	-
PC27. . ensure that all the guidelines for what to do and what not to do to build sustainability in 5s are mentioned in the 5s check lists/ work instructions and are easily searchable	1	2.5	-	-
PC28. ensure continuous training of the team members on 5s in order to increase their awareness and support implementation	1	2	-	-
PC29. ensure that all visual controls, notice boards, symbols etc at the manufacturing place are created, working and are put up as per the requirement	1	2.5	-	-
NOS Total	29	71	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N0022
NOS Name	Ensure implementation of 5S activities at the shop floor & the office area
Sector	Automotive
Sub-Sector	Generic
Occupation	Generic
NSQF Level	6
Credits	TBD
Version	1.0
Last Reviewed Date	15/03/2014
Next Review Date	15/03/2016
NSQC Clearance Date	

Qualification Pack

ASC/N8301: Understand the process and equipment requirement to complete the task

Description

This OS unit is about understanding the job requirement, what processes need to be executed, what equipments will be used for the activity and what is the required output considering the standards specified

Scope

The person will be responsible for Understand the machining & assembling requirements, equipment and parameters to be set for the process Escalations of queries on the given job

Elements and Performance Criteria

Understand the machining & assembling requirements, equipment and parameters to be set for the process

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

- PC1..** ensure that the team members understand and follow all the does and donts of the manufacturing process as defined in sops/ work instructions or defined by supervisors/ master technicians
- PC2..** ensure that all the drawings, sketches and models are understood at the beginning of the process to finalize the operations to be performed by the operator
- PC3..** ensure accurate understanding of the geometric dimensions and tolerance before initiating the product making process
- PC4..** understand the right machining & assembling methodology and process to be adopted for completing the work order through discussions with the supervisor/ master technician and reading the process manuals/ work instructions/standard operating procedures
- PC5..** understand the various machining processes (manual as well as on cnc) like grinding, tapering , milling , boring , cutting etc. which will be required during the tool making and die making process
- PC6..** understand the material required and the equipment availability for executing the activity
- PC7..** understand the various assembling process parameters like cycle time, fitting tolerances, torque application, bolting and fastening before starting the assembling process, as mentioned in the work instructions/ sop manual
- PC8..** understand 5 s related to the work station and line area

Escalations of queries on the given job

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

- PC9..** in case while understanding the drawings and sketches some problems are observed, ensure that they are highlighted to the design team
- PC10..** refer the queries to a competent internal specialist if they cannot be resolved by the operator on own
- PC11..** obtain help or advice from specialist if the problem is outside his/her area of competence or experience

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PC12.. confirm self-understanding with the specialist holding discussions so that all doubts & queries can be resolved before the actual process execution

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.** functional processes like Procurement, Store management, inventory management, quality management and key contact points for query resolution
- KU4.** good understanding of prototyping and testing process
- KU5.** understanding on homologation and validation process
- KU6.** knowledge in tools like CAD, CAM, CAE, PRO-E etc.
- KU7.** information systems like SAP, ERP etc.
- KU8.** knowledge of simulation software, DFMEA, APQP basic preparation process of machine and machine settings
- KU9.** operations for various machining related tools
- KU10.** the method of reading and interpreting the various drawings (2D, 3D and line sketches)
- KU11.** how to visualize the final product output and conduct quality verification tests

Generic Skills (GS)

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

- GS1.** document the available information
- GS2.** note down observations (if any) in the given format
- GS3.** write information documents to internal departments/ internal teams or enter the information in online ERP systems under guidance of the supervisor
- GS4.** read and interpret technical specifications of the specimen
- GS5.** read equipment manuals and process documents to understand the equipments and processes better
- GS6.** read internal information documents sent by internal teams
- GS7.** read and interpret technical customer drawings
- GS8.** read engineering drawings and symbols used in drawings and sketches
- GS9.** discuss task lists, schedules and activities with the supervisor
- GS10.** effectively communicate with the team members
- GS11.** question the shop supervisor in order to understand the nature of the problem and to clarify queries
- GS12.** attentively listen with full attention and comprehend the information given by the speaker
- GS13.** plan and organize the work order and jobs received from the Operator
- GS14.** organize all process/ equipment manuals so that sorting/ accessing information is easy
- GS15.** support the supervisor in scheduling tasks for tool room helper

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- GS16.** use common sense and make judgments during day to day basis
- GS17.** use reasoning skills to identify and resolve basic problems use intuition and keen observation skills to detect any potential problems which could arise during operations
- 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 timelines and quality norms
- GS21.** detect problems in day to day tasks
- GS22.** support supervisor in using specific problem solving techniques and detailing out the problems
- GS23.** discuss possible solution with the supervisor for problem solving
- GS24.** make decisions in emergency conditions in case the supervisor is no

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Understand the machining & assembling requirements, equipment and parameters to be set for the process</i>	22	53	-	-
PC1.. ensure that the team members understand and follow all the does and donts of the manufacturing process as defined in sops/ work instructions or defined by supervisors/ master technicians	2	6	-	-
PC2.. ensure that all the drawings, sketches and models are understood at the beginning of the process to finalize the operations to be performed by the operator	3	7	-	-
PC3.. ensure accurate understanding of the geometric dimensions and tolerance before initiating the product making process	3	7	-	-
PC4.. understand the right machining & assembling methodology and process to be adopted for completing the work order through discussions with the supervisor/ master technician and reading the process manuals/ work instructions/standard operating procedures	3	7	-	-
PC5.. understand the various machining processes (manual as well as on cnc) like grinding, tapering , milling , boring , cutting etc. which will be required during the tool making and die making process	3	7	-	-
PC6.. understand the material required and the equipment availability for executing the activity	3	7	-	-
PC7.. understand the various assembling process parameters like cycle time, fitting tolerances, torque application, bolting and fastening before starting the assembling process, as mentioned in the work instructions/ sop manual	3	7	-	-
PC8.. understand 5 s related to the work station and line area	2	5	-	-
<i>Escalations of queries on the given job</i>	8	17	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC9.. in case while understanding the drawings and sketches some problems are observed, ensure that they are highlighted to the design team	2	5	-	-
PC10.. refer the queries to a competent internal specialist if they cannot be resolved by the operator on own	2	4	-	-
PC11.. obtain help or advice from specialist if the problem is outside his/her area of competence or experience	2	4	-	-
PC12.. confirm self-understanding with the specialist holding discussions so that all doubts & queries can be resolved before the actual process execution	2	4	-	-
NOS Total	30	70	-	-

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National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8301
NOS Name	Understand the process and equipment requirement to complete the task
Sector	Automotive
Sub-Sector	Research & Development
Occupation	prototyping
NSQF Level	6
Credits	TBD
Version	1.0
Last Reviewed Date	30/12/2013
Next Review Date	30/12/2015
NSQC Clearance Date	

Qualification Pack

ASC/N8302: Preparing the machine, auxiliary apparatus and metal work pieces

Description

This NOS is about preparing the surface of the metal parts by removing dust, moistures etc., cleaning the manufacturing and assembling apparatus and installing the metal parts on the manufacturing and assembling machine

Scope

The person needs to Ensure arrangement for working ,manual or computer controlled, equipment's for machining , PPE's and other material as per the requirement of the machining process Ensure cleaning the machining/assembling equipment before executing the operations and setup the equipment Escalations of queries for the given job

Elements and Performance Criteria

Ensure arrangement for working ,manual or computer controlled, equipment's for machining , PPE's and other material as per the requirement of the machining process

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

- PC1..** understand the material required and the equipment availability for executing the activity
- PC2..** ensure that the related engineering drawings and sketches are available before starting the product manufacturing process
- PC3..** ensure that the required material is procured from the store before starting the machining / other necessary process
- PC4..** ensure that the helper/ assistant technician brings the required material and tools before the start of the assembling operations

Ensure cleaning the machining/assembling equipment before executing the operations and setup the equipment

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

- PC5..** ensure that the helper/ assistant operator cleans the surface of the machines to remove dust and any other impurities like grease, oil, paint etc.
- PC6..** ensure that the assembly apparatus is setup as per the selected assembling process and the internal sops/ work instructions and the setting standards for the machine
- PC7..** ensure that the calibration of the manufacturing tools and measuring tools is accurate

Escalations of queries for the given job

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

- PC8..** immediately refer the queries to the supervisor to avoid any delay in the actual process
- PC9..** confirm self-understanding to the shop head during the discussions so that all doubts & queries can be resolved before the actual process execution

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

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- KU1.** relevant standards and procedures followed in the company
- KU2.** different types of products manufactured by the company
- KU3.** functional processes like Procurement, Store management, inventory management, quality management and key contact points for query resolution
- KU4.** good understanding of prototyping and testing process
- KU5.** understanding on homologation and validation process
- KU6.** knowledge in tools like CAD, CAM, CAE, PRO-E etc
- KU7.** information systems like SAP, ERP etc.
- KU8.** knowledge of simulation software, DFMEA, APQP basic preparation process of machine and machine settings
- KU9.** operations for various machining related tools
- KU10.** the method of reading and interpreting the various drawings (2D, 3D and line sketches)
- KU11.** how to visualize the final product output and conduct quality verification tests

Generic Skills (GS)

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

- GS1.** document information
- GS2.** note down observations (if any) related to the process
- GS3.** write information documents to internal departments/ internal teams or enter the information in online ERP systems under guidance of the supervisor
- GS4.** read and interpret technical specifications of the assemble specimen
- GS5.** read equipment manuals and process documents to understand the equipments and processes better
- GS6.** read internal information documents sent by internal teams
- GS7.** read and interpret engineering drawings
- GS8.** discuss task lists, schedules and activities with the supervisor
- GS9.** effectively communicate with the team members
- GS10.** question the supervisor in order to understand the nature of the problem and to clarify queries
- GS11.** attentively listen with full attention and comprehend the information given by the speaker
- GS12.** plan and organize the work order and jobs received from the Operator
- GS13.** organize all process/ equipment manuals so that sorting/ accessing information is easy
- GS14.** visualize the final job product after understanding the given drawing/sketches
- GS15.** co relate the type of job output required with the machining/assembling methodology to be used
- GS16.** identify the strengths and weakness of various assembling process
- GS17.** use common sense and make judgments during day to day basis
- GS18.** use reasoning skills to identify and resolve basic problems
- GS19.** follow instructions and work on areas of improvement identified and complete the assigned tasks with minimum supervision

Qualification Pack

- GS20.** complete the job defined by the supervisor within the timelines and quality norms
- GS21.** take self-initiatives in driving small projects with the supervisor like operation improvement, training of helpers and assistant operators, 5S, Kaizen etc

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Ensure arrangement for working ,manual or computer controlled, equipment's for machining , PPE's and other material as per the requirement of the machining process</i>	15	31	-	-
PC1.. understand the material required and the equipment availability for executing the activity	5	9	-	-
PC2.. ensure that the related engineering drawings and sketches are available before starting the product manufacturing process	3	6	-	-
PC3.. ensure that the required material is procured from the store before starting the machining / other necessary process	4	8	-	-
PC4.. ensure that the helper/ assistant technician brings the required material and tools before the start of the assembling operations	3	8	-	-
<i>Ensure cleaning the machining/assembling equipment before executing the operations and setup the equipment</i>	11	27	-	-
PC5.. ensure that the helper/ assistant operator cleans the surface of the machines to remove dust and any other impurities like grease, oil, paint etc.	2	8	-	-
PC6.. ensure that the assembly apparatus is setup as per the selected assembling process and the internal sops/ work instructions and the setting standards for the machine	5	10	-	-
PC7.. ensure that the calibration of the manufacturing tools and measuring tools is accurate	4	9	-	-
<i>Escalations of queries for the given job</i>	4	12	-	-
PC8.. immediately refer the queries to the supervisor to avoid any delay in the actual process	2	6	-	-
PC9.. confirm self-understanding to the shop head during the discussions so that all doubts & queries can be resolved before the actual process execution	2	6	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8302
NOS Name	Preparing the machine, auxiliary apparatus and metal work pieces
Sector	Automotive
Sub-Sector	Research & Development
Occupation	prototyping
NSQF Level	6
Credits	TBD
Version	1.0
Last Reviewed Date	30/12/2013
Next Review Date	30/12/2015
NSQC Clearance Date	

Qualification Pack

ASC/N8303: Performing the actual prototyping operations

Description

This NOS is about performing the actual prototyping operations from the 2D drawing and vehicle model given by the design team

Scope

The person is responsible for developing Phase 1 prototype developing Phase 2 Prototype developing Phase 3 Prototype developing Documentation and record keeping

Elements and Performance Criteria

Phase 1 prototype

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

- PC1..** ensure that the operator receives the 2d drawing from the design team after clearance from the quality
- PC2..** study the drawings/ sketches to understand the operations to be performed by the operator/ machinist and plan sequences of operations for fabricating products
- PC3..** ensure proper selection of material from the vendors to be used based on properties like hardness and tolerance for forming the product
- PC4..** make the product from the representative aggregates made from temporary loading or conveyor parts
- PC5..** ensure usage of borrowed parts from the similar vehicles to avoid duplication
- PC6..** ensure usage of the scrap/redundant parts of the existing vehicle
- PC7..** ensure that the work pieces are sized, machined and assembled at the respective manufacturing areas as per the drawings
- PC8..** ensure that the basic safety compliances are met in the prototype
- PC9..** ensure that the body and chassis system specifications are met
- PC10..** ensure for proper front , side and roof crash protection
- PC11..** ensure for packaging and dynamic clearances
- PC12..** ensure proper outline ergonomics checks
- PC13..** ensure that the complete concept of new product /new technology is evaluated and a proper feedback is given to the deign team
- PC14..** verify the conformance of the output product to the specifications mentioned in the work instructions/ sops using precision measurement tools
- PC15..** ensure that routine maintenance activities are carried out by the operator as per the checklist provided by the maintenance team

Phase 2 Prototype

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

- PC16..** ensure that the process starts after the 2 nddrawing release vehicle from the design team and verified by the quality team

Qualification Pack

- PC17..** ensure that the operator receives the changed 2d drawing from the design team and designs the product as per the design layouts
- PC18..** study the drawings/ sketches to understand the operations to be performed by the operator/ machinist and plan sequences of operations for fabricating products
- PC19..** ensure that the parts are made from soft tools & through alternate methods and processes
- PC20..** ensure that the intended product design achieves the functional & performance requirements on fuel type, vehicle ground clearances, high voltage testing and fitment of all major components
- PC21..** ensure that the vehicle architectural systems are validated
- PC22..** ensure enablement of the evaluation , improvement and finalization of the design after this stage
- PC23..** ensure initiation of dfmea , dfa, dfm is initiated and completed during the alpha prototype phase
- PC24..** verify the conformance of the output product to the specifications mentioned in the work instructions/ sops using precision measurement tools
- PC25..** ensure that routine maintenance activities are carried out by the operator as per the checklist provided by the maintenance team

Phase 3 Prototype

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

- PC26..** ensure that the process starts after the 3rd drawing release vehicle from the design team and verified by the quality team
- PC27..** ensure that the operator receives the changed 2d drawing from the design team and designs the product as per the design layouts
- PC28..** study the drawings/ sketches to understand the operations to be performed by the operator/ machinist and plan sequences of operations for fabricating products
- PC29..** ensure that the condition of permanent tooling / final profile as directed by this release is adhered to.
- PC30..** ensure achievement of desired functional & performance specifications and technical targets on high voltage system, brake handling and on- road testing
- PC31..** ensure achievement of vehicle durability and reliability
- PC32..** ensure crashworthiness of the product
- PC33..** ensure compliance to emission norms
- PC34..** ensure adherence to pfmea process for vehicle manufacturing
- PC35..** provide feedback to the design team and ensure availability of all parts & reports from production tooling to handover the prototype to the process control and production team
- PC36..** handover the product to test centre for various durability and performance testing

Documentation and record keeping

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

- PC37..** ensure all records related to prototyping are maintained in the format used by the organization/ process mentioned in the work instructions
- PC38..** report any issues observed during record keeping to the supervisor in a timely manner

Knowledge and Understanding (KU)

Qualification Pack

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.** quality management practices of the organization
- KU4.** good understanding of prototyping and testing process
- KU5.** understanding on homologation and validation process
- KU6.** knowledge in tools like CAD, CAM, CAE, PRO-E etc.
- KU7.** information systems like SAP, ERP etc
- KU8.** knowledge of simulation software, DFMEA, APQP basic preparation process of machine and machine settings
- KU9.** operations for various machining related tools
- KU10.** the method of reading and interpreting the various drawings (2D, 3D and line sketches)
- KU11.** how to visualize the final product output and conduct quality verification tests

Generic Skills (GS)

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

- GS1.** document information
- GS2.** note down observations (if any) related to the design aspect
- GS3.** write information documents to internal departments/ internal teams or enter the information in online ERP systems under guidance of the supervisor
- GS4.** read and interpret technical 2D drawings
- GS5.** read and understand the various tolerances and specifications for the product
- GS6.** read internal information documents sent by internal teams
- GS7.** discuss task lists, schedules and activities with the supervisor
- GS8.** effectively communicate with the team members
- GS9.** question the customer in order to understand the nature of the problem and to clarify queries
- GS10.** attentively listen with full attention and comprehend the information given by the speaker
- GS11.** plan and organize the work order and jobs received
- GS12.** plan and organize the design/ process/quality documents received from internal customers
- GS13.** organize all manuals so that sorting out information is fast
- GS14.** carefully analyse the 2D drawing for various customer specifications
- GS15.** carefully do the manufacturing and assembly operations with relevant actions as listed in SOP/WI
- GS16.** detect problems in day to day tasks
- GS17.** support supervisor in using specific problem solving techniques and detailing out the problems
- GS18.** discuss possible solution with the supervisor for problem solving

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- GS19.** make decisions in emergency conditions in case the supervisor is not available(as per the authority matrix defined by the organization)
- GS20.** identify defective parts in the manufacturing line by comparing manufactured pieces with the work standard
- GS21.** link the defect observed with the overall impact on the performance of the component
- GS22.** clearly establishes a goal for self or others to accomplish
- GS23.** empowers subordinates to achieve desired results
- GS24.** be a role model for the team and lead from front
- GS25.** motivates and engages team members, rewards and encourages team to achieve
- GS26.** resolves team conflicts
- GS27.** contributes to building a positive team spirit
- GS28.** contributes individual strengths & maximize team performance
- GS29.** exhibits objectivity & openness to others views
- GS30.** collaborates with stakeholders to achieve the desired state of result
- GS31.** use previous experience in resolving problems and taking decisions
- GS32.** make timely and independent decisions on the line/ shift within the boundaries of the delegation matrix of the organization
- GS33.** familiarise with leading practices available in the market
- GS34.** think independently on new approaches to manufacturing process, material management, data management and team management
- GS35.** represent any new ideas/ approaches on process improvement and productivity improvement to the seniors in the team
- GS36.** understands customer needs
- GS37.** addresses customer needs
- GS38.** manages customer relationships
- GS39.** understands importance of customer feedback and drives customer focus

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Phase 1 prototype</i>	15.5	33	-	-
PC1.. ensure that the operator receives the 2d drawing from the design team after clearance from the quality	1	1	-	-
PC2.. study the drawings/ sketches to understand the operations to be performed by the operator/ machinist and plan sequences of operations for fabricating products	1.5	2	-	-
PC3.. ensure proper selection of material from the vendors to be used based on properties like hardness and tolerance for forming the product	1.5	2	-	-
PC4.. make the product from the representative aggregates made from temporary loading or conveyor parts	1	3	-	-
PC5.. ensure usage of borrowed parts from the similar vehicles to avoid duplication	1	1	-	-
PC6.. ensure usage of the scrap/redundant parts of the existing vehicle	1	1	-	-
PC7.. ensure that the work pieces are sized, machined and assembled at the respective manufacturing areas as per the drawings	1	3	-	-
PC8.. ensure that the basic safety compliances are met in the prototype	1	3	-	-
PC9.. ensure that the body and chassis system specifications are met	1	3	-	-
PC10.. ensure for proper front , side and roof crash protection	1	3	-	-
PC11.. ensure for packaging and dynamic clearances	1	2	-	-
PC12.. ensure proper outline ergonomics checks	1	2	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13.. ensure that the complete concept of new product /new technology is evaluated and a proper feedback is given to the design team	1	3	-	-
PC14.. verify the conformance of the output product to the specifications mentioned in the work instructions/ sops using precision measurement tools	1	2	-	-
PC15.. ensure that routine maintenance activities are carried out by the operator as per the checklist provided by the maintenance team	0.5	2	-	-
<i>Phase 2 Prototype</i>	8	19	-	-
PC16.. ensure that the process starts after the 2nd drawing release vehicle from the design team and verified by the quality team	0.5	2	-	-
PC17.. ensure that the operator receives the changed 2d drawing from the design team and designs the product as per the design layouts	0.5	1	-	-
PC18.. study the drawings/ sketches to understand the operations to be performed by the operator/ machinist and plan sequences of operations for fabricating products	1	2	-	-
PC19.. ensure that the parts are made from soft tools & through alternate methods and processes	0.5	2	-	-
PC20.. ensure that the intended product design achieves the functional & performance requirements on fuel type, vehicle ground clearances, high voltage testing and fitment of all major components	1	2	-	-
PC21.. ensure that the vehicle architectural systems are validated	1	2	-	-
PC22.. ensure enablement of the evaluation , improvement and finalization of the design after this stage	1	2	-	-
PC23.. ensure initiation of dfmea , dfa, dfm is initiated and completed during the alpha prototype phase	1	2	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC24.. verify the conformance of the output product to the specifications mentioned in the work instructions/ sops using precision measurement tools	1	2	-	-
PC25.. ensure that routine maintenance activities are carried out by the operator as per the checklist provided by the maintenance team	0.5	2	-	-
<i>Phase 3 Prototype</i>	6	16	-	-
PC26.. ensure that the process starts after the 3rd drawing release vehicle from the design team and verified by the quality team	0.25	1	-	-
PC27.. ensure that the operator receives the changed 2d drawing from the design team and designs the product as per the design layouts	0.25	1	-	-
PC28.. study the drawings/ sketches to understand the operations to be performed by the operator/ machinist and plan sequences of operations for fabricating products	1	2	-	-
PC29.. ensure that the condition of permanent tooling / final profile as directed by this release is adhered to.	0.5	1	-	-
PC30.. ensure achievement of desired functional & performance specifications and technical targets on high voltage system, brake handling and on-road testing	1	2	-	-
PC31.. ensure achievement of vehicle durability and reliability	1	1	-	-
PC32.. ensure crashworthiness of the product	0.5	2	-	-
PC33.. ensure compliance to emission norms	0.5	2	-	-
PC34.. ensure adherence to pfmea process for vehicle manufacturing	0.5	2	-	-
PC35.. provide feedback to the design team and ensure availability of all parts & reports from production tooling to handover the prototype to the process control and production team	0.25	1	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC36.. handover the product to test centre for various durability and performance testing	0.25	1	-	-
<i>Documentation and record keeping</i>	0.5	2	-	-
PC37.. ensure all records related to prototyping are maintained in the format used by the organization/ process mentioned in the work instructions	0.25	1	-	-
PC38.. report any issues observed during record keeping to the supervisor in a timely manner	0.25	1	-	-
NOS Total	30	70	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N8303
NOS Name	Performing the actual prototyping operations
Sector	Automotive
Sub-Sector	Research & Development
Occupation	prototyping
NSQF Level	6
Credits	TBD
Version	1.0
Last Reviewed Date	30/12/2013
Next Review Date	30/12/2015
NSQC Clearance Date	

Qualification Pack

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 % : 75

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	15
ASC/N0022.Ensure implementation of 5S activities at the shop floor & the office area	29	71	-	-	100	15
ASC/N8301.Understand the process and equipment requirement to complete the task	30	70	-	-	100	25

Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ASC/N8302.Preparing the machine, auxiliary apparatus and metal work pieces	30	70	-	-	100	25
ASC/N8303.Performing the actual prototyping operations	30	70	-	-	100	20
Total	144	356	-	-	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.