Model Curriculum

CNC Operator Machining Technician L3

SECTOR:	**AUTOMOTIVE**
SUB-SECTOR:	**MANUFACTURING**
OCCUPATION:	**MACHINING**
REF ID:	**ASC/Q3501**
NSQF LEVEL:	**3**

Skill India

AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

for

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**CNC Operator Machining Technician L3**' QP No. '**ASC/Q3501NSQF Level 3**'

Date of Issuance: **April 9th, 2016**

Valid up to*: **April 10nd, 2018**

**Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)*

Authorised Signatory
(Automotive Skills Development Council)

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CNC Operator Machining Technician Level 3

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "CNC Operator Machining Technician Level 3", in the "Automotive" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**CNC Operator Machining Technician Level 3**		
Qualification Pack Name & Reference ID.	CNC Operator Machining Technician Level 3 (ASC/Q3501)		
Version No.	1.0	**Version Update Date**	23-01-2017
Pre-requisites to Training	Minimum Educational Qualifications : Class 10 Experience : 2-3 years in different Machining activities		
Training Outcomes	**After completing this programme, participants will be able to:** **Assist in Carrying out pre-machining activities :** Engineering drawings, Manufacturing process, Work instructions and SOP's, Coolants and lubricants, Measuring instruments **Support the operator in performing machining operations:** Adjusting Machine tools, Use of hand tools to Position/Secure/Align cutting tools, Turning/drilling/milling machine operations, Feeding of components, identification of Defects in manufactured components, Inspection of machining operations, Recording of machining operations **Support the operator in conducting all post machining operations:** Perform minor machine maintenance, Perform de-burring on the machine components, Quality check, Use of vernier callipers, micrometres, gauges, rulers, Escalate any queries **Maintain a safe and healthy working environment:** Safety Procedures, use of PPE ,Hazards and Risks, Waste Disposal, Personal Hygiene **Maintain 5S at the work premises:** 5S,Sorting and Placing, Segregation of waste, Technique of waste disposal, Ensure cleaning of self and workplace		

This course encompasses 5 out of 5 National Occupational Standards (NOS) of "Welding Technician Level 3" Qualification Pack "ASC/Q3501" issued by "Automotive Skills Development Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Assist in Carrying out pre-machining activities** **Theory Duration** (hh:mm) 26:00 **Practical Duration** (hh:mm) 45:00 **Corresponding NOS Code** ASC/ N3504	• List and explain the different types of machining processes • List and explain the different types of tools used in the machining process with respect to type of process to be conducted • Understand the basic principles of geometry and drawing • List and explain the various measuring instruments • Explain the basic principles of 5 S in manufacturing – Cleaning, sorting etc. • Understand the output product requirement by reading the engineering drawing specified in the work instructions/ work order • Understand the work order and standard Operating Procedures(SOP) • Select proper coolant and lubricant required for machining the required component • Set the machine stops or guides as per the specified lengths indicated through scales or work instructions	Laptop White board, Marker, Projector, stationary, CNC Lathe or turning Machine, Drilling machine, Milling machine, Coolants, lubricants, Measuring tools (compasses, calipers, rulers, Micrometer), Hand tools, Cutting tools, Power tools, Work pieces, PPE, First aid kit fire extinguishers.
2	**Support the operator in performing machining operations** **Theory Duration** (hh:mm) 26:00 **Practical Duration** (hh:mm) 50:00 **Corresponding NOS Code** ASC/N3505	• Support the operator in setting up machine to perform machining operations • Select proper cutting tools as per the work instructions • Operate hand wheels or valves to feed the component • Maintain proper temperature in the lathe machine chamber by controlling correct flow of coolant • Observe machine operations to detect defects in the component manufactured • Assist the operator in recording operational data such as pressure readings, length of strokes, feed rates, speed etc	Laptop White board, Marker, Projector, stationary, CNC Lathe or turning Machine, Drilling machine, Milling machine, operating manuals, work instruction SOP's, Coolants, lubricants, Measuring tools (compasses, Vernier calliper, rulers, gauges, Micrometer), Hand tools, Cutting tools, Work pieces, Fixtures, PPE, First aid kit fire extinguishers.
3	**Support the operator in conducting all**	• Maintain the machine as per proper operational condition • Perform minor machine maintenance	Laptop White board, Marker, Projector, jigs and fixtures, hand drilling machine, grinding

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	post machining operations **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 45:00 **Corresponding NOS Code** ASC/N3506	activities such as oiling and cleaning machine components • Refill the coolants and lubricants in the machine reservoir • Perform de-burring activities by following all safe work procedures, rules and instructions • Use files, hand grinders, wire brush and power tools to remove the extra burrs, sharp edges, rust and chips from the metal surface • Use inspection equipment to measure the specifications of the finished component • Note down the observations of the basic inspection process and identify pieces which comply with the specified standards • Assist operator in changing worn out machine parts	machine, milling machine, bench vice, Work pieces, V-Block, clamps Steel tape, Steel rule, Try square, Combination square, Vernier calliper, Micrometre, Dividers, Weighing scales, height gauge, Bevel protractor, Plug gauge, surface plate, Hacksaw frame adjustable, Files collets, taps, end mills, cutting tool, drills and taps, Ball peen hammer, Adjustable Wrench, Screw driver set, Allen key, Spanner set, Spindle key, air gauge (unit/plugs/rings) , Drill vice, machinist vice, Hand vice, Vice grip, Pliers, Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit, Cutting oil, grease gun, coolants, lubricants, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel
4	**Maintain a safe and healthy working environment** **Theory Duration** (hh:mm) 22:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** ASC/N0006	• Explain workplace Hazards and risks • List and explain the contents of the first aid kit • List and explain the personal protective equipment like safety gloves, safety glasses, safety shoes and safety helmet • Identify activities which can cause potential injury • Report the concerned authorities about the potential risks • Report the concerned authorities about machine breakdowns, damages • Follow the instructions given in the equipment manual • Follow the Safety, Health and Environment related practices • Operate the machine using the recommended Personal Protective Equipment (PPE) • Maintain a clean and safe working environment • Maintain high standards of personal hygiene at the work place • Carry out waste disposal • Report appropriately the medical officer/ HR in case of self or an employee's	Laptop White board, Marker, Projector, Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel, Fire extinguisher, Leather safety gloves, aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		illness	
5	**Maintain 5S at the work premises** **Theory Duration** (hh:mm) 22:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** ASC/N0021	• List and describe the components of personal hygiene • Keep work benches or work surfaces free from un-necessary items • Segregate waste in hazardous/non-hazardous waste as per the sorting work instructions • Dispose waste safely • Check that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions • Keep the workplace clean • Store the cleaning material and equipment in the correct location and in good condition • Follow 5S at workplace	Laptop White board, Marker, Projector, Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel, Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit
	Total Duration **Theory Duration 120:00** **Practical Duration 200:00**	**Unique Equipment Required:** Machine, milling machine, bench vice, Work pieces, V-Block, clamps Steel tape, Steel rule, Try square, Combination square, Vernier calliper, Micrometre, Dividers, Weighing scales, height gauge, Bevel protractor, Plug gauge, surface plate, Hacksaw frame adjustable, Files collets, taps, end mills, cutting tool, drills and taps, Ball peen hammer, Adjustable Wrench, Screw driver set, Allen key, Spanner set, Spindle key, air gauge (unit/plugs/rings) , Drill vice, machinist vice, Hand vice, Vice grip, Pliers, Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit, Cutting oil, grease gun, coolants, lubricants, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel.	

Grand Total Course Duration: 320Hours, 0 Minutes

*(This syllabus/ curriculum has been approved by **(Automotive Skills Development Council)***

Trainer Prerequisites for Job role: "CNC Operator Machining Technician Level 3" mapped to Qualification Pack: "ASC/Q3501, Version 1.0"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "ASC/Q3501Version 1.0".
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well- organized and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	**Minimum Educational Qualifications**	Degree/ Diploma/ ITI in Mechanical engineering
4a	**Domain Certification**	Certified for Job Role: "CNC Operator Machining Technician Level 3" mapped to QP: "ASC/Q3501". Minimum accepted score as per ASDC guidelines is 70%.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/ Q0102". Minimum accepted score as per MEPSC guidelines is 80%.
5	**Experience**	2-3 years in different Machining activities(Trainer should have 5 yrs/8 yrs/10yrs Of respective experience in a machine shop of a manufacturing organization & experience in working with CNC machine.

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	CNC Operator Machining Technician Level 3
Qualification Pack	ASC/Q3501Version 1.0
Sector Skill Council	Automotive Skills Development Council

Sr. No.	Guidelines for Assessment
1	Assessment to be conducted by ASDC as per competency output defined in the NOS/QP and the assessment criteria provided in the NOS/QP
2	Assessment to be carried out by a third party Assessment Body duly affiliated to the SSC.
3	ASDC assessments will be comprehensive and cover all aspects of acquired knowledge, Practical skills and also basic ability to communicate. Accordingly, evaluation process would include: i. Theory/Knowledge test ii. Practical demonstration test iii. Face to Face Viva-Voce
4	Theory/Knowledge assessment will be carried out on line through a link provided for each assessment that generates a random paper from a bank of questions available at the back end. - Exception to an online test in favour of Paper Test would be subject to non-availability of requisitebroad band and/or hardware. - On line test would be conducted in the presence of an ASDC assessor till web enabled proctoring is deployed.
5	ASDC assessor would be conducting Practical and Viva as per the criteria provided in the NOS/QP.
6	Cut off criteria for certification (Marks obtained in %):80 %

NOS Title/ NOS Elements	NOS & Performance Criterion Description	Marks allocation		
ASC/N3504	**Assist in Carrying out pre-machining activities**	**Theory**	**Viva**	**Practical**
Understanding the component requirements	PC1. Understand the output product requirement by reading the engineering drawing specified in the work instructions/ work order PC2. Clearly understanding the does and don'ts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors PC3. Reading the control panel instructions/ job orders to determine the correct output product specifications PC4. Understanding the tooling instructions as specified in the Operating Manual/ Work Instructions or Standard Operating Procedures PC5. Selection of proper coolant and lubricant required for machining the required component		25	25
Checking the dimensions for the component	PC6. Set the machine stops or guides as per the specified lengths indicated through scales or work instructions PC7. Measure and mark reference points/ cutting lines on the work pieces, using compasses, calipers, rulers and other measuring tools		10	10
	Sub total		**35**	**35**
ASC/N 3505	**Support the operator in performing machining operations**	**Theory**	**Viva**	**Practical**
Setting up machine as per work instructions	PC1. Set-up, adjust machine tools in order to perform machining operations and keep dimension within the specified tolerance limit specified in the Standard Operating Procedures/ Operating manuals PC2. Support the operator in aligning and securely hold fixtures, cutting tools etc. onto the machine PC3. Position/ secure/ align cutting tools in tool holders of the machine, using hand tools and verify their positions with measuring instruments		10	25
Support the machinist/ operator in performing machining on the	PC4. Start lathe or turning/drilling/milling machine for operations PC5. Support in select cutting tools and tooling			

component	instructions as per the work instructions / supervisor 's instructions PC6. Operate hand wheels or valves in order to feed the component and allow cooling and lubricating of the same as per the instructions given by the machinist/supervisor PC7. Turn on the coolant valves and start their flow to maintain temperature in the lathe machine chamber PC8. Move tool holders manually or by turning the hand wheels in order to feed tools along the machined component/ piece		10	40
Observe/ Record the machining operations	PC9. Observe machine operations to detect defects in the component manufactured PC10. Observe the machine operations for any malfunctions and immediately inform the supervisor of any malfunction observed to prevent damage to the machining equipment/ output product PC11. Support the operator in recording operational data such as pressure readings, length of strokes, feed rates, speed etc in the formats specified by the supervisors		5	10
	subtotal		**25**	**75**
ASC/N 3506	**Support the operator in conducting all post machining operations**	**Theory**	**viva**	**Practical**
Perform minor machine maintenance activities	PC1. Maintain the machine as per proper operational condition PC2. Perform minor machine maintenance activities such as oiling or cleaning machine and its components PC3. Oiling or cleaning machines as per the schedules given in the maintenance plan PC4. Adding coolant and lubricant in machine reservoir		10	20
Perform de- burring activity on the machined components	PC5. With the help of the correct tool remove the extra burrs, sharp edges, rust and chips from the metal surface PC6. 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. PC7. For automated processes perform shot blasting/ vibro processes for completing de-burring operations		10	30
Check quality of	PC8. Support the operator in measuring the			

machined component (Gauging)	specifications of the finished component and verify conformance as per CP/ WI PC9. Use devices like micrometers, vernier calipers, gauges, rulers and any other inspection equipment for measuring specifications with valid calibration status. PC10. Support the operator in noting down the observations of the basic inspection process and identify pieces which comply with the specified standards PC11. 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		15	50
Assist the operator in the tool change process	PC12. Assist the operator in changing different worn machine accessories, such as cutting tools(as per tool life listed, recommended) and brushes, other hand tools PC13. Replace machine part as per work instructions, using hand tools or notify supervisor/ engineering personnel for taking corrective actions PC14. 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		15	50
	Subtotal		**50**	**150**
ASC/N 0006	**Maintain a safe and healthy working environment**	**Theory**	**viva**	**Practical**
Identify and report the risks identified	PC1. Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals ,loud noise PC2. Inform the concerned authorities about the potential risks identified in the processes, workplace area/ layout, materials used etc. PC3. Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations PC4. Create awareness amongst other by sharing information on the identified			

	risks			
Create and sustain a Safe, clean and environment friendly work place	PC5. Follow the instructions given on the equipment manual describing the operating process of the equipment PC6. Follow the Safety, Health and Environment related practices developed by the organization PC7. Operate the machine using the recommended Personal Protective Equipment (PPE) PC8. Maintain a clean and safe working environment near the work place and ensure there is no spillage of chemicals, production waste, oil, solvents etc. PC9. Maintain high standards of personal hygiene at the work place PC10. Ensure that the waste disposal is done in the designated area and manner as per organization SOP. PC11. Inform appropriately the medical officer/ HR in case of self or an employee's illness of contagious nature so that preventive actions can be planned for others		70	80
	subtotal		70	80
ASC/N 0021	**Maintain 5S at the work premises**	**Theory**	**Viva**	**practical**
Ensure sorting	PC1. Follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the workbenches or work surfaces. PC2. Ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions PC3. Follow the technique of waste disposal and waste storage in the proper bins as per SOP PC4. Segregate the items which are labelled as red tag items for the process area and keep them in the correct places PC5. Sort the tools/ equipment/ fasteners/ spare parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions PC6. Ensure that areas of material storage areas are not overflowing PC7. Properly stack the various types of		10 10	20 20

	boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required PC8. Return the extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area PC9. Follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards			
Ensure proper documentation and storage (organizing , streamlining)	PC10. Follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists PC11. Check that the items in the respective areas have been identified as broken or damaged PC12. Follow the given instructions and check for labelling of fluids, oils. lubricants, solvents, chemicals etc. and proper storage of the same to avoid spillage, leakage, fire etc. PC13. Make sure that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions		10	20
Ensure cleaning of self and the work place	PC14. Check whether safety glasses are clean and in good condition PC15. Keep all outside surfaces of recycling containers are clean PC16. Ensure that the area has floors swept, machinery clean and generally clean. In case of cleaning, ensure that proper displays are maintained on the floor which indicate potential safety hazards PC17. Check whether all hoses, cabling & wires are clean, in good condition and clamped to avoid any mishap or mix up PC18. Ensure workbenches and work surfaces are clean and in good condition PC19. Follow the cleaning schedule for the lighting system to ensure proper illumination PC20. Store the cleaning material and equipment in the correct location and in good condition PC21. Ensure self-cleanliness - clean uniform,		10	40

	clean shoes, clean gloves, clean helmets, personal hygiene			
Ensure sustenance	PC22. Follow the daily cleaning standards and schedules to create a clean working environment PC23. Attend all training programs for employees on 5 S PC24. Support the team during the audit of 5 S PC25. Participate actively in employee work groups on 5S and encourage team members for active participation PC26. Follow the guidelines for What to do and What not to do to build sustainability in 5S as mentioned in the 5S check lists/ work instructions		10	20
	Sub total		**50**	**120**
	Total	**30**	**230**	**460**