

Model Curriculum

CNC Operator-Grinding Machine Centre

SECTOR: CAPITAL GOODS
SUB-SECTOR: 1. Machine Tools
2. Dies, Moulds and Press Tools
3. Plastics Manufacturing Machinery
4. Textile Manufacturing Machinery
5. Process Plant Machinery
6. Electrical and Power Machinery
7. Light Engineering Goods
OCCUPATION: Machining
REF ID: CSC/Q0117, V1.0
NSQF LEVEL: 3



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CAPITAL GOODS SKILL COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **'CNC Operator - Grinding Machine Centre'** OP No. **'CSC/Q 0117, NSQF Level 3'**

Date of Issuance: April 14th, 2014

Valid up to : August 30th, 2016

*Refer to the relevant version of the Qualification Pack at the
NSQF portal (www.nsqf.gov.in) for any amendments/updates.



Authorised Signatory
Tourism & Hospitality Skill Council



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CNC Operator-Grinding Machine Centre

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “CNC Operator –Grinding Machine Centre”, in the “Capital Goods” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	CNC Operator-Grinding Machine Centre		
Qualification Pack Name & Reference ID. ID	CSC/Q0117, v1.0		
Version No.	1.0	Version Update Date	
Pre-requisites to Training	10 th Std. Pass		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Perform machining and grinding of parts as per instructions using computer numerically controlled machines: perform grinding operations using Computer Numerically Controlled (CNC) machines, to produce a range of components with a number of different features. This involves carrying out the grinding operations, in accordance with approved procedures, using different Computer Numerical Control (CNC) • Basic health and safety practices at the workplace: identify risks and hazards at workplace, use of PPE, and apply good housekeeping practices, etc., • Work effectively with others: effectively communicate with others and demonstrate good ethical practices and discipline. 		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “CNC Operator-Grinding machine centre” Qualification Pack issued by “Capital Goods Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Perform machining and grinding of parts as per instructions using Computer Numerically Controlled machines</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 120:00</p> <p>Corresponding NOS Code CSC/N0117</p>	<ul style="list-style-type: none"> • Explain uses and application of CNC grinding machines • Identify main parts of a CNC grinding machine and state their function • Explain various CNC grinding operations • List common tools and equipment required for CNC grinding • Identify Personal Protective Equipment used in CNC grinding operation • Wear Personal Protective Equipment correctly • Interpret component drawing and job specifications correctly • Interpret various symbols and conventions used in engineering drawings • Distinguish between ferrous and non ferrous material and state their physical properties • Identify various forms of metals • State physical properties of commonly used grinding materials • Describe mechanical properties of commonly used grinding materials • List various systems of measurement • Convert units from one system of measurement to another • Identify various work holding devices and state their uses • Analyse various error messages and take corrective actions • Follow recommended health and safety processes while performing the grinding operation • Identify work place hazards and take corrective actions to minimise such hazards • Verify that all tools , equipment , power tool cables, extension leads are in a safe and usable condition • Examine physically for any foreign objects, dirt or other contamination and clean the component if required • Prepare the work area for grinding operation as per standard procedure • Verify that machine guards are in order • Extract information from engineering drawings and related specifications 	<p>Training kit (Trainer guide, PowerPoint), Job specification document, work holding devices, CNC grinding machine with all accessories, measuring instruments, Personal Protective Equipment</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> Operate the machine both in hand and power modes Produce ground components as per the specification <ul style="list-style-type: none"> Diameters (Plain, stepped, tapered, centric) Flat faces and shoulders Internal and external profiles External screw threads Chamfers and radii Bores (Parallel, tapered) Forms (Involute, helical, concave, convex and other special forms) Curvic couplings Tracks (Internal, external, undercuts and bearings) Dimensional tolerance equivalent to +/- 0.01mm Flatness and squareness within 0.0125 mm per 25 mm Angles within +/- 15 sec Surface finish 0.8 micrometer Ground bores/holes within H8 Screw threads medium fit Perform the application of roughing and finishing cuts Describe the effect of roughing and finishing on wheel life, surface finish and dimensional accuracy <p>Carry out necessary documents as per the company policy</p>	
2	<p>Health and safety</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 08:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> Explain the importance of personal protective equipment (PPE) required for gas cutting operation State the causes for accidents Identify job site hazardous work and state possible causes of risk or accident at the workplace Explain the importance of '5S' at the workplace 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes</p>
3	<p>Fire Safety</p> <p>Theory Duration (hh:mm) 05:00</p>	<ul style="list-style-type: none"> Explain types of fires - Class A, B, C and D Select appropriate fire extinguisher to control fire Use PASS method to operate a fire extinguisher 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>Class A, B, C, D and K fire extinguishers</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> Follow fire safety signs and safe evacuation method in case of a fire Identify the location of assembly point, fire exit, fire alarm Follow reporting procedure in case of a fire 	
4	<p>Emergencies, rescue and first aid procedure</p> <p>Theory Duration (hh:mm) 09:00</p> <p>Practical Duration (hh:mm) 18:00</p> <p>Corresponding NOS Code CSC/N1335</p>	<ul style="list-style-type: none"> Follow electrical safety procedures Use approved method to rescue a person from electrocution State the importance of first aid Identify the contents of a first aid kit and their application Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc. Use of CPR process Bandage wounds Explain stages of crisis and crisis management Prepare an incident report 	<p>Training kit (Trainer guide, PowerPoint)</p> <p>First aid kit with all contents</p>
5	<p>Work effectively with others</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N1336</p>	<ul style="list-style-type: none"> Explain the importance of team work and team dynamics State 4Cs of working in a team Explain types of communication Apply effective communication technique Overcome barriers to effective communication Demonstrate active listening skills Demonstrate good customer service skills Explain the importance of ethical behaviour in your day-to-day work State the importance of discipline in life and apply the same at workplace 	<p>Training kit (Trainer guide, PowerPoint)</p>
	<p>Total Duration</p> <p>Theory Duration 64:00</p> <p>Practical Duration 236:00</p>	<p>Unique Equipment Required: Job specification document, work holding devices, CNC grinding machine with all accessories, measuring instruments, apron, gloves, safety boots, overalls, eye shields, goggles, ear plugs, measuring instruments,, Class A, B, C, D and K fire extinguishers, PPE, First aid kit with all contents</p>	

Grand Total Course Duration: **300 Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by [Capital Goods Skill Council](#))

Trainer Prerequisites for Job role: “CNC Operator –Grinding Machine Centre” mapped to Qualification Pack: “CSC/Q0117 v1.0”

Sr. No.	Area	Details
1	Description	Performing of grinding operations on range of metal components using the Computer Numerically Controlled (CNC) machine as per the given instructions.
2	Personal Attributes	Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness
3	Minimum Educational Qualifications	Diploma /Degree in Mechanical Engineering
4a	Domain Certification	Certified for Job Role: “CNC Operator- Grinding Machine Centre” mapped to QP: “CSC/Q0117, v1.0”. Minimum accepted score is 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted as per respective SSC guidelines is 80%.
5	Experience	<ul style="list-style-type: none"> • 3-4 years of industry experience in the relevant field • 3-4 years of teaching experience

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	CNC Operator- Grinding Machine Center
Qualification Pack	CSC/Q0117, v1.0
Sector Skill Council	Capital Goods Skill Council

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each 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 PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5	To pass the Qualification Pack , every trainee should score a minimum of 70% in every NOS
6	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
1.CSC/N0117 Install mechanical equipment at site	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work	100	3	1	2
	PC2.adhere to procedures and guidelines for personal protective equipment (PPE) and other relevant safety regulations while performing grinding operations		3	1	2
	PC3.work following laid down procedures and instructions		2	0	2
	PC4.ensure work area is clean and safe from hazards		2	0	2
	PC5.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition		2	0	2
	PC6.check that all measuring equipment is within calibration date		3	1	2
	PC7.check if the machine is ready for production		2	0	2
	PC8.physically check that the job components to ensure that they are free from foreign objects, dirt or other contamination		3	1	2
	PC9.ensure availability of job specification from a valid source		3	1	2
	PC10.read and establish job requirements from the job specification document		4	2	2
	PC11.prepare and maintain the work area as per procedure or operation specification		4	2	2
	PC12.ensure that machine guards are in place and are correctly adjusted		2	0	2
	PC13.hold components securely, without distortion		5	2	3
	PC14.check that the operating program is at the correct start point and the work piece is clear of the machine spindle		2	0	2
	PC15.follow the defined operating procedures and apply safe working practices and procedures at all times		4	2	2
	PC16.ensure that machine settings are adjusted as and when required to maintain the required Accuracy		3	1	2
	PC17.obtain the component drawings, specifications and/or job instructions required for the components to be machined		2	0	2
	PC18.use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate ISO standards in relation to work undertaken)		4	2	2
	PC19.operate the machine controls in both hand		2	0	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	and power modes				
	PC20.interpret the visual display and the various messages displayed correctly		5	2	3
	PC21.find the correct restart point in the program then the machine has been stopped before completion of the program		3	0	3
	PC22.use metric(SI) systems of measurement and conversion formulae		4	2	2
	PC23.handle and store grinding wheels safely and Correctly		3	1	2
	PC24.produce ground components which cover the specifications, as applicable to the machine type used		3	1	2
	PC25.perform the application of roughing and finishing cuts and the effect on wheel life, surface finish and dimensional accuracy		4	1	3
	PC26.perform the application of cutting fluids with regard to a range of different materials		4	1	3
	PC27.recognize CNC grinding machining faults and identify when adjustments need to be made		4	1	3
	PC28.handle common problems that can occur during the CNC grinding operations and how these can be overcome		4	1	3
	PC29.ensure that the components produced meet the required specification for quality and accuracy		3	1	2
	PC30. plan logically to achieve work production Targets		3	1	2
	PC31.complete necessary documentation related to job progress and reporting		2	1	1
	PC32.deal promptly and effectively with problems within their control and seek help and guidance from the relevant people where required		2	0	2
	PC33.leave the work area in a safe and tidy condition on completion of the fitting activities		1	0	1
	Total		100	29	71
2.CSC/N1335 Use basic health and safety practices at the workplace	PC1.use protective clothing/equipment for specific tasks and work conditions	100	5	2	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3.state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4.identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5.carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work		4	2	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	environment of the job role				
	PC6.state location of general health and safety equipment in the workplace		3	2	1
	PC7.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC8.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC9.lift heavy objects safely using correct procedures		5	2	3
	PC10.apply good housekeeping practices at all times		4	2	2
	PC11.identify common hazard signs displayed in various areas		5	2	3
	PC12.retrieve and/or point out documents that refer to health and safety in the workplace		3	1	2
	PC13.use the various appropriate fire extinguishers on different types of fires correctly		4	1	3
	PC14.demonstrate rescue techniques applied during fire hazard		4	1	3
	PC15.demonstrate good housekeeping in order to prevent fire hazards		3	1	2
	PC16.demonstrate the correct use of a fire extinguisher		4	1	3
	PC17.demonstrate how to free a person from electrocution		4	1	3
	PC18.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		4	1	3
	PC19.demonstrate basic techniques of bandaging		3	1	2
	PC20.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		4	1	3
	PC21.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC22.administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2
	PC23.demonstrate the artificial respiration and the CPR Process		3	1	2

Assessable Outcome	Assessment Criteria	Total Mark (300)	Out Of	Marks Allocation	
				Theory	Skills Practical
	PC24.participate in emergency procedures		3	2	1
	PC25.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		4	1	3
	PC26.demonstrate correct method to move injured people and others during an emergency		4	1	3
	Total		100	36	64
3.CSC/N1336 Work effectively with others	PC1.accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	100	10	3	7
	PC2.accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3.give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7
	PC4.display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5.consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7
	PC6.display appropriate communication etiquette while working		10	3	7
	PC7.display active listening skills while interacting with others at work		10	3	7
	PC8.use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9.demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10.escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
	Total		100	30	70
	Grand Total		300	95	205
	Percentage Weightage:			31	69
	Minimum Pass% to qualify (aggregate):			70	