

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: Nov 24th, 2017

Valid up to : Nov 24th, 2021

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



Authorised Signatory
(Capital Goods 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	31/10/2018
Pre-requisites to Training	10th Standard Pass, preferably		
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. • Apply basic health and safety practices at the workplace. • Work effectively with colleagues and supervisors. 		

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>Introduction</p> <p>Theory Duration (hh:mm) 03:00</p> <p>Practical Duration (hh:mm) 00:00</p> <p>Corresponding NOS Code Bridge module</p>	<ul style="list-style-type: none"> • Explain uses and application of a CNC grinding machine. • Identify main parts of a CNC grinding machine. • Explain various CNC grinding operations. • List common tools and equipments required for CNC grinding. • Identify Personal Protective Equipment (PPE) used in CNC grinding operation. • Explain role and responsibilities of a ‘CNC Operator-Grinding Machine Centre’. 	Training kit (Trainer guide, Presentations).
2	<p>Machining and grinding of parts as Computer Numerically Controlled machines</p> <p>Theory Duration (hh:mm) 17:00</p> <p>Practical Duration (hh:mm) 120:00</p> <p>Corresponding NOS Code CSC/N0117</p>	<ul style="list-style-type: none"> • Interpret component drawings and job specifications correctly. • Interpret various symbols and conventions used in engineering drawings. • Distinguish between ferrous and non-ferrous materials. • State physical properties of most commonly used ferrous and non-ferrous metals. • 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. • Choose correct conversion factors to convert units to various systems of measurement. • Identify various work holding devices and state their uses. • Analyse various error messages to take corrective action. • Follow recommended health and safety processes while performing the grinding operation. • Identify work place hazards to avoid accidents. • 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. 	Training kit (Trainer guide, Presentations), job specification document, work holding devices, CNC grinding machine with all accessories, measuring instruments, personal protective equipment (PPE).

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> • Verify that machine guards are in order. • Extract information from engineering drawings and related specifications. • Operate the machine both in hand and power modes. • Produce ground components as per the specification. • Perform the application of roughing and finishing cuts. • Describe the effect of roughing and finishing on wheel life, surface finish and dimensional accuracy. • Perform documentation as per the company policy. 	
3	<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). • Identify appropriate PPE for the various tasks performed. • Identify job site risks and hazards to avoid accidents at the work place. Hazards: sharp edged and heavy tools; heated metals; gas cylinders; welding radiation; hazardous surfaces(sharp, slippery, uneven, chipped, broken, etc.); hazardous substances(chemicals, gas, fumes, dust, etc.); physical hazards(working at heights, large and heavy objects and machines, sharp and piercing objects, tools and machines, intense light, load noise, obstructions in corridors, by doors, blind turns, noise, over stacked shelves and packages, etc.) electrical hazards (power supply and points, loose and naked cables and wires, electrical machines and appliances, etc.). Possible causes of risk and accident: physical actions; reading; listening to and giving instructions; inattention; sickness and incapacity (such as drunkenness); health hazards (such as untreated injuries and contagious illness) • Identify the names and locations of people responsible for health and safety in the workplace. • Identify documents that refer to health and safety in the workplace and where they are located. • Carry out safe working practices while dealing with hazards to ensure the safety of self and others. 	<p>Training kit (Trainer guide, Presentation), leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes.</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>Safe working practices: using protective clothing and equipment; putting up and reading safety signs; handle tools in the correct manner and store and maintain them properly; keep work area clear of clutter, spillage and unsafe object lying casually; while working with electricity take all electrical precautions like insulated clothing, adequate equipment insulation, use of control equipment, dry work area, switch off the power supply when not required, etc.; safe lifting and carrying practices; use equipment that is working properly and is well maintained; take due measures for safety while working in confined places, trenches or at heights, etc. including safety harness, fall arrestors, etc.</p> <ul style="list-style-type: none"> Inspect steps and ladders for faults, set them and use them safely. Ladder faults: corrosion of metal components, deterioration, splits and cracks timber components, imbalance, loose rungs, missing/unfixed nuts or bolts, etc. Ladders set up: firm/level base, clip/lash down, leaning at the correct angle, etc. Work safely in and around trenches, elevated places and confined areas. Lift heavy objects safely using correct procedures. Apply good housekeeping practices at all times. Good housekeeping practices: clean/tidy work areas, removal/disposal of waste products, protect surfaces Identify common hazard signs displayed in various areas. Various areas: on chemical containers; equipment; packages; inside buildings; in open areas and public spaces, etc. 	
4	<p>Fire Safety</p> <p>Theory Duration (hh:mm) 05:00</p>	<ul style="list-style-type: none"> Identify causes of fire accidents. Recognise required fire extinguisher based on the type of fire. Types of fires: Class A: e.g. ordinary solid combustibles, such as wood, paper, cloth, plastic, charcoal, etc.; Class B: flammable liquids and gases, such as gasoline, propane, 	<p>Training kit (Trainer guide, Presentation), Class A, B, C and D 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>	<p>diesel fuel, tar, cooking oil, and similar substances; Class C: e.g. electrical equipment such as appliances, wiring, breaker panels, etc. (These categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no longer receiving electricity); Class D: combustible metals such as magnesium, titanium, and sodium (These fires burn at extremely high temperatures and require special suppression agents).</p> <ul style="list-style-type: none"> • Use the various appropriate fire extinguishers on different types of fires correctly. • Interpret fire safety signs. • Inspect evacuation plan in case of fire. • Identify the location of assembly point, fire exit and fire alarm. • Follow reporting procedure in case of a fire. • Participate in fire safety drills at the workplace. • Demonstrate good housekeeping in order to prevent fire hazards. 	
5	<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. • Administer first aid in case of minor injuries, bleeding, burns, choking, electrical shock, poisoning, etc. • Demonstrate the artificial respiration and CPR process. • Follow correct method to move injured people and others during an emergency. • Explain stages of crisis and crisis management. • Participate in emergency procedures as per role. <p>Emergency procedures: raising alarm, safe/efficient evacuation, correct means of escape, correct assembly point, roll call, correct return to work.</p> <ul style="list-style-type: none"> • Write an accident/incident report or dictate a report to another person and send report to person responsible. 	<p>Training kit (Trainer guide, Presentation), First aid kit with all contents.</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>Incident Report includes details of: name, date/time of incident, date/time of report, location, environment conditions, persons involved, sequence of events, injuries sustained, damage sustained, actions taken, witnesses, supervisor/manager notified.</p>	
6	<p>Working 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"> • State various categories of people that one is required to communicate and co-ordinate within the organization. • Explain the importance of effective communication in the workplace. • Explain the importance of teamwork in organizational and individual success. • Describe various components of effective communication and active listening. • Describe the barriers to effective communication. • Provide and receive information to and from authorized persons accurately and within agreed timescale. • Give information to others clearly, at a pace and in a manner that helps them to understand. • Assist others in performing tasks in a positive and helpful manner, where required and possible. • Take measures to maximize effectiveness and efficiency in carrying out tasks by consulting with and assisting others. • Follow appropriate communication etiquette while working. Communication etiquette: do not use abusive language; use appropriate titles and terms of respect; do not eat or chew while talking (vice versa), use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism, etc. • Apply active listening skills while interacting with others at work. • Explain the importance of ethics and discipline for professional success. • Describe common reasons for interpersonal conflict and ways of managing interpersonal conflict 	<p>Training kit (Trainer guide, Presentation)</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>effectively.</p> <ul style="list-style-type: none"> Explain the importance of developing effective working relationships for professional success. Display responsible and disciplined behaviors at the workplace. Disciplined behaviors: e.g. punctuality; completing tasks as per given time and standards; not gossiping and idling time; eliminating waste, honesty, etc. Escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict. 	
	<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 and D 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

Criteria For Assessment Of Trainees

Job Role: CNC Operator-Grinding Machine Center

Qualification Pack: CSC/Q0117

Sector Skill Council: Capital Goods Skill Council

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. 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 centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Total Marks: 300		Compulsory		NOS		Marks Allocation	
Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out of	Theory	Skills Practical		
CSC/N0117Perform machining and grinding of parts as per instructions using Computer Numerically Controlled machines	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 and power modes	2	0	2
PC20.interpret the visual display and the various messages displayed correctly	5	2	3
PC21.find the correct restart point in the program when the machine has been stopped before completion of the program	3	0	3
PC22.use metric (SI) systems of measurement and conversions where applicable	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
CSC/N1335 Use basic health and safety practices at the workplace	PC1.use protective clothing/equipment for specific tasks and work conditions	100	4	1	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		4	2	2
	PC6.state methods of accident prevention in the work environment of the job role		3	2	1
	PC7.state location of general health and safety equipment in the workplace		5	2	3
	PC8.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC9.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC10.lift heavy objects safely using correct procedures		4	2	2
	PC11.apply good housekeeping practices at all times		5	2	3

	PC12.identify common hazard signs displayed in various areas		3	1	2
	PC13.retrieve and/or point out documents that refer to health and safety in the workplace		4	1	3
	PC14.use the various appropriate fire extinguishers on different types of fires correctly		3	1	2
	PC15.demonstrate rescue techniques applied during fire hazard		3	1	2
	PC16.demonstrate good housekeeping in order to prevent fire hazards		4	1	3
	PC17.demonstrate the correct use of a fire extinguisher		4	1	3
	PC18.demonstrate how to free a person from electrocution		4	1	3
	PC19.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	1	2
	PC20.demonstrate basic techniques of bandaging		3	1	2
	PC21.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		3	1	2
	PC22.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC23.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
	PC24.demonstrate the artificial respiration and the CPR Process		3	1	2
	PC25.participate in emergency procedures		4	1	3
	PC26.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC27.demonstrate correct method to move injured people and others during an emergency		4	2	2
		Total	100	36	64
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